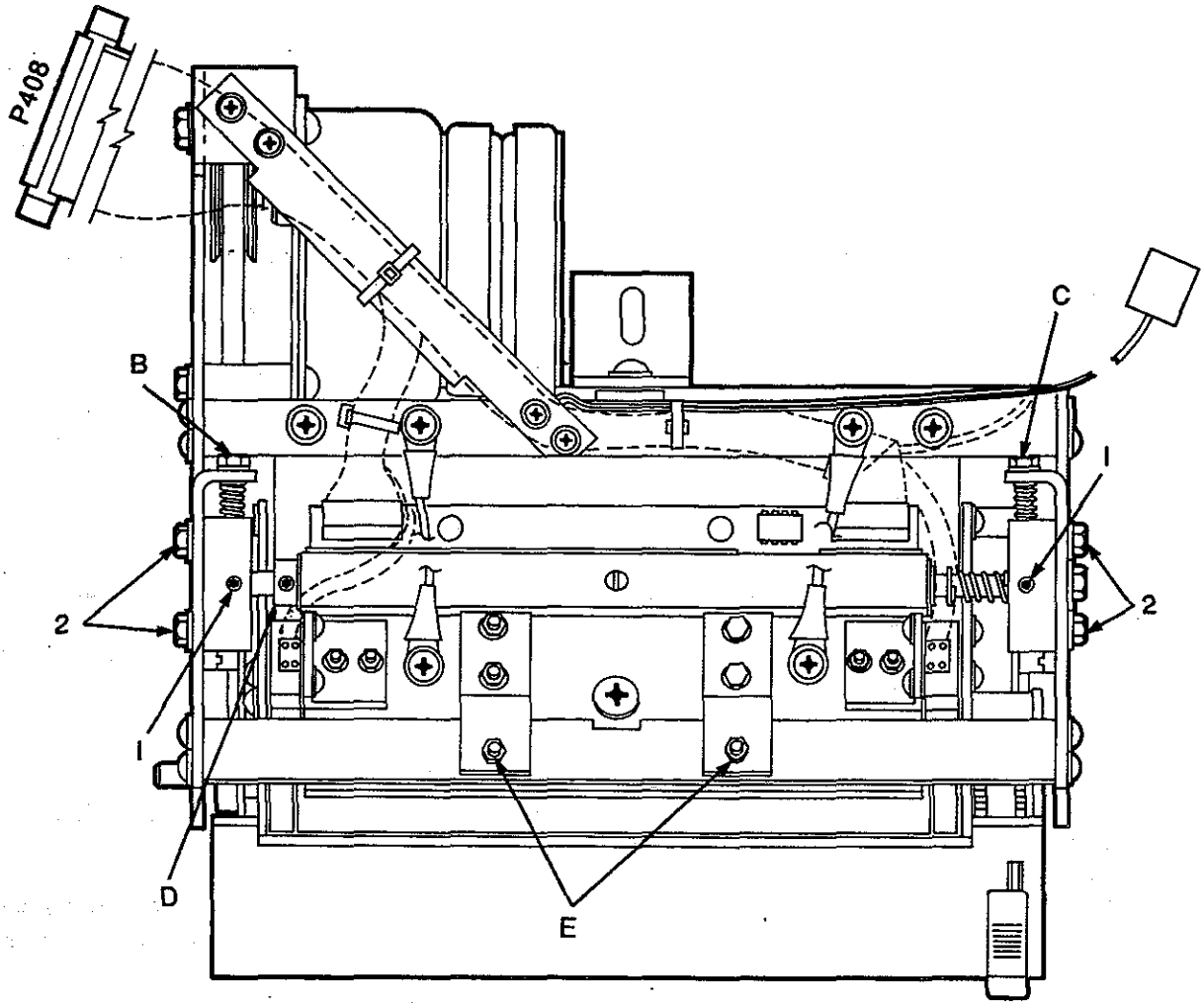


Figure 10-1. Model 118 Strip Chart Recorder Top View

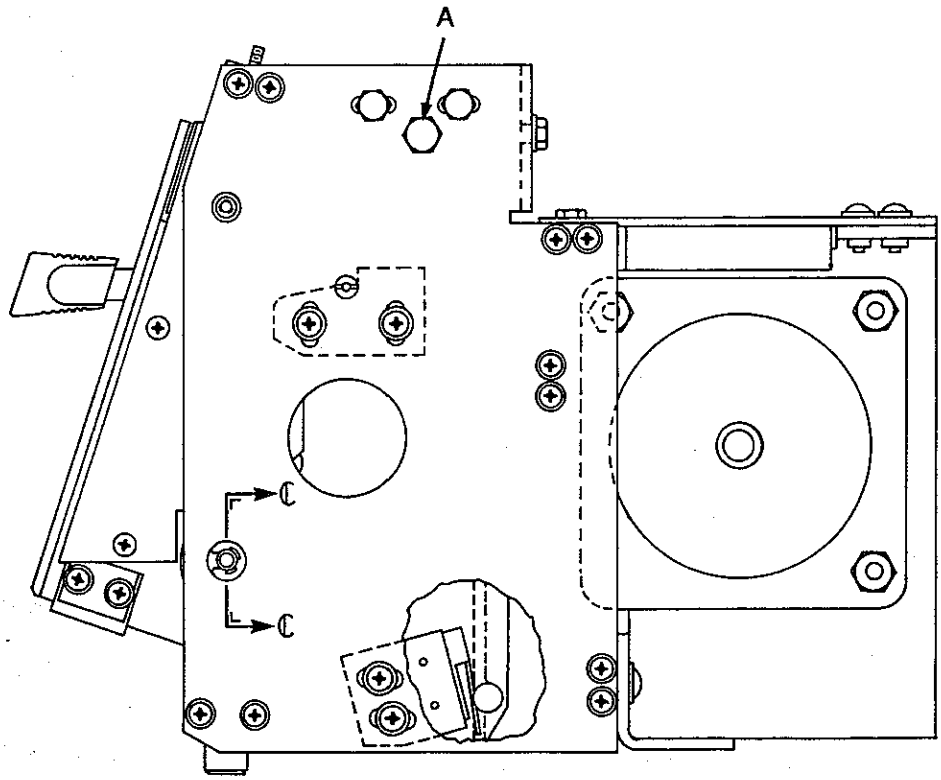


Figure 10-2. Model 118 Strip Chart Recorder Right Side View

Photo-Sensor Replacement

Although the two reflective-sensors may be replaced in the field, tight tolerance repositioning is required to ensure that the sensors function properly. Therefore, it is recommended that the photo-sensors be replaced by a representative of the Corometrics Service Department. If the replacement is done locally, it must be done according to the procedure given in this Section.

Photo-Sensor Removal Procedure. Use the following procedure for removing the Model 118 photo-sensor. The recorder must be removed from its monitor housing, as described in the section *Removing the Strip Chart Recorder*, before replacement of the photo-sensor.

1. Remove the sensor cables from the black sensor housings. Record the orientation of the connectors.

2. Remove the two screws attaching the black sensor housing to the angle brackets.

3. Discard the sensor and housing.

Photo-Sensor Replacement Procedure. Use the following procedure for replacing the Model 118 photo-sensor.

1. Attach the sensor and housing to the angle brackets using the two socket head screws. Do not tighten the screws.

2. Reconnect the sensor cable insuring that it is orientated exactly the same as before.

3. Adjust the height of the sensor housing. The height of the sensor housing must be .018 to .028 inch from the tangent line between the drive roller and paper bar. This is a very critical adjustment; failure to set the proper height will result in photo-sensor malfunction.

TRANSDUCER SERVICING

This section of the manual provides information which will help the biomedical engineer service the cable and wiring on the Model 118's transducer assemblies. Before attempting any service on the transducer assembly, it is important to mention, the information provided in this section is not intended as a substitute for proper professional training, or familiarity with the Model 118. Only qualified service personnel should attempt servicing Model 118 transducers.

HANDLING PRECAUTIONS

Transducers are delicate measuring instruments and must be handled accordingly. Transducer damage can be avoided by taking the following precautions:

- Avoid banging or dropping transducers.
- Refrain from wrapping transducer cables around transducer body.
- Do not immerse transducers in aqueous solutions. Follow the Model 118 Maternal/Fetal Monitor Operator's Manual regarding cleaning of transducers.
- Do not pull on cables when removing transducer plugs from the monitor front-panel connectors; remove plugs by grasping the gripper.

TRANSDUCER CABLE AND CONNECTOR SERVICING

Transducer Plug Construction

Construction details of plugs used on the transducer cable are shown in Figure 11-1. A plastic ring (10) slips over the plug's front. To remove the ring, gently insert a screwdriver blade in back of ring and push forward. (This may require inserting the blade at a number of points around the ring.) Once the ring is removed, insert one or more blunt tools (such as a spline-head screwdriver tip) under the lip of the gripper (2). Gently work gripper to the rear by working the tools around the circumference while simultaneously prying upward.

> NOTE: The gripper adheres tightly to the plug assembly and is normally difficult to remove. Also, the retaining ring (7) is likely to be pulled off in the process. Locate black ring in gripper and remove it with a hooked tool. The ring and gripper form an outer covering for the plug assembly. This assembly consists of a half-shell with tongue (8), a half-shell with strain relief (9), the cable strain relief (3) which is fastened to the half-shell with two metric screws, and the pin housing (6). This housing contains the shorter circuit contact pins (5) and the longer ground pin (4). These pins are held captive in the housing by fingers which expand when the pins are inserted.

Transducer Plug Replacement

Replacement plugs can be ordered from the Corometrics Service Department. Before ordering, refer to Table 11-1 for appropriate part numbers. Except for the strain gauge, the general method of replacing transducer plugs, depicted in Figure 11-1, is described in the following steps.

Table 11-1. Transducer Plug Part Numbers

TRANSDUCER PLUG	PART NUMBER
MECG or LEGPLATE	6158F
US	8675A
TOCO	6158J
STRAIN GAUGE	6158K

1. Transducer cable is routed through the gripper first. Slide gripper, followed by retaining ring, down cable until they are out of the way.

2. Locate grounding pin (the longer pin) in kit. It should be soldered only to the wire specified in wire table of corresponding plug.

3. Set aside shorter pins which will be soldered to remaining wires.

4. After soldering, insert pins in corresponding holes of pin housing. Push in each pin until it bottoms out and is retained by the pin spring fingers, preventing it from backing out of the hole.

> NOTE: If a pin is removed from the female sprocket housing, it must be discarded and replaced without exception.

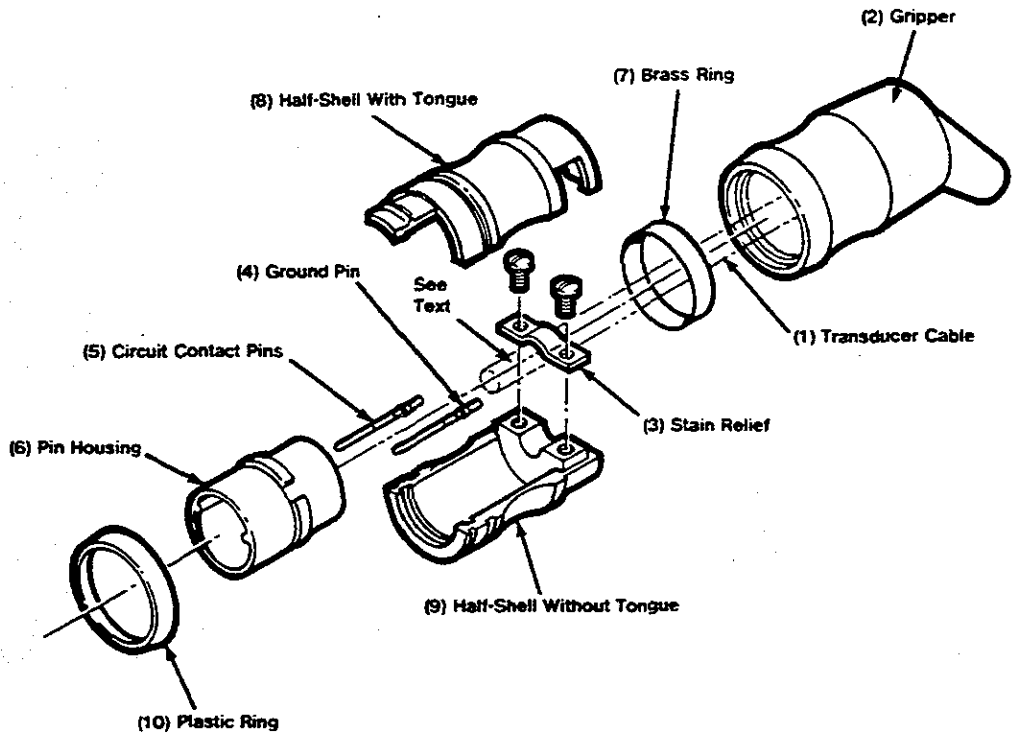


Figure 11-1. Transducer Plug Construction

5. Insert the pin connector into corresponding recess of the half-shell (with strain-relief mounting holes). Position housing so the two dots at the back are visible and at right angles to the plane of the half-shell. Push cable into strain-relief slot. Ensure slot surrounds a portion of the cable with outer covering intact.

6. Fasten strain-relief to half-shell with the two metric screws. The indent of the strain relief should face inward on the smaller cable (3-5 mm) and outward on the larger cable (5-7 mm).

   NOTE: Since the strain-gauge cable has a tube open to atmospheric pressure, care must be exercised to ensure the tube does not lose its patency during installation of the cable strain relief.

7. Place half-shell (with tongue) on pin housing, aligning it with the two dots on back of housing. The half-shells should snap together evenly. Slip retaining ring over them to hold assembly together.

8. Slide gripper up cable and align the two projections at rear of plug assembly with the two recesses at rear of gripper.

   NOTE: Do not allow projections and recesses to become misaligned while sliding gripper onto plug or gripper will not seat properly. Position tongue opposite the gripper boot through which the cable extends. This ensures that the cable will extend downward once the plug is inserted into the monitor.

   ⚠ **CAUTION:** When sliding the gripper over plug assembly, pull cable through boot to prevent any kinking inside gripper.

9. Install plastic ring on front of plug. This completes standard plug replacement procedures.

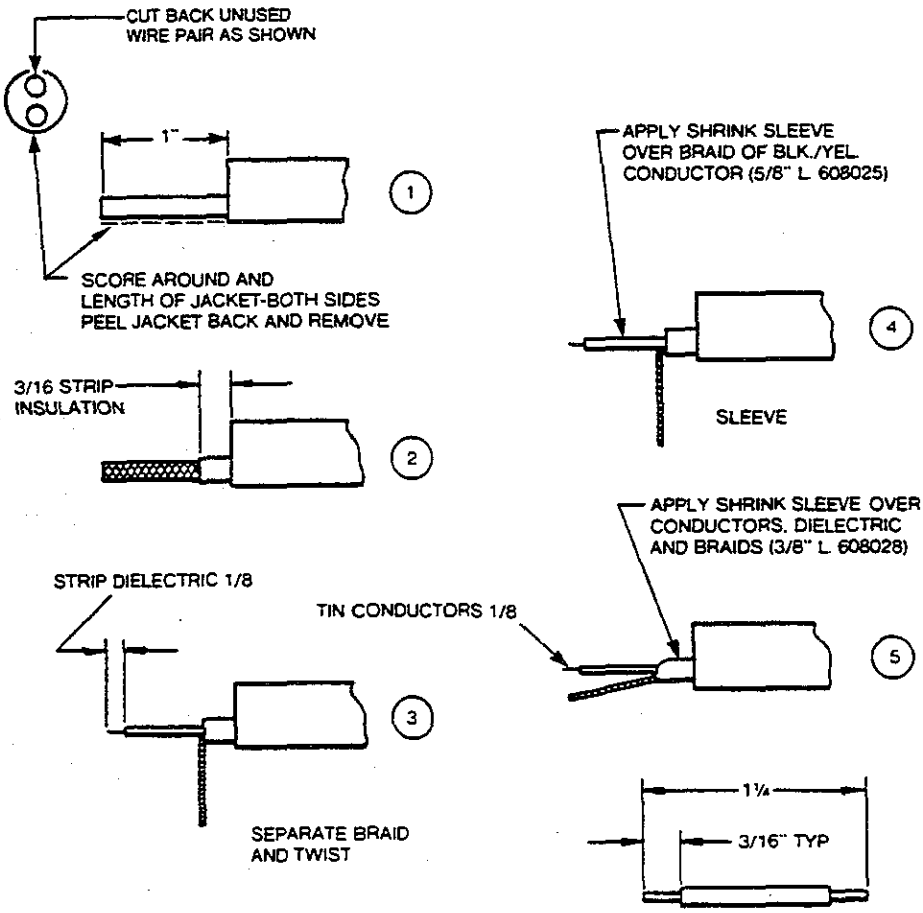


Figure 11-2. Ultrasound Cable Plug Replacement

US Transducer Plug Replacement

1. Obtain an US replacement plug kit, Corometrics Part No. 8675A.
2. Refer to page 11-1, *Transducer Plug Replacement*, and perform steps 1 through 4.

⚠ **CAUTION:** In the following steps, when soldering to braid and cable end, avoid excessive heat since the polyethylene insulation melts very easily.

3. Prepare cable and jumper wire as depicted in Figure 11-2.
4. Refer to Table 11-2 for pin connections.
5. Solder the shield braid of wire to the US Transmit/ Receive Shield (long pin).
6. Solder one end of the green jumper wire to US Enable pin. Solder the other end of the jumper to US Enable Ground pin.
7. Solder remaining wires to their respective short pins.
8. Complete assembly of plug as outlined in the section, *Transducer Plug Replacement*, steps 5 through 9.

US Transducer Disassembly

Three screws fasten the top cover to the base. Remove the top cover by removing the two #2-56 screws and the one #4-40 center screw. The plate below is fastened by five #2-56 screws. Remove these screws and lift off the plate. The coax can now be unsoldered.

To reassemble transducer, solder the new coax, replace the plate and insert and tighten the five screws; and replace the top cover and insert and tighten the three screws.

Tocotransducer Plug Replacement

1. Obtain tocotransducer plug replacement kit, Corometrics Part No. 6158J.
2. Refer to the section, *Transducer Plug Replacement*, and perform steps 1 through 4.
3. Prepare cable, shield wires, and jumper wire as depicted in Figure 11-3.
4. Refer to Table 11-3 for pin connections.
5. Solder the Shield Ground pin (longer pin) to the shield wire.
6. Solder the yellow wire and one end of the #30 AWG green jumper to the Reference/Enable pin.
7. Solder free end of green jumper to TOCO Enable pin.
8. Solder remaining wires to their designated pins.
9. Complete assembly of plugs as outlined in the section, *Transducer Plug Replacement*, steps 5 through 9.

Table 11-2 Ultrasound Plug (Blue) Pin Connections

PIN NUMBER	PIN LENGTH	I.D.	WIRE COLOR
1	Short		—
2	Short		—
3	Short	Overall Shield	Bus Wire
4	Long	US Transmit/Receive Shield	White Co-ax Shield
5	Short	US Transmit/Receive	White Co-ax
6	Short		—
7	Short		—
8	Short		—
9	Short		—
10	Short		—
11	Short	US Enable	#24 AWG Green Jumper
12	Short	US Enable Ground	#24 AWG Green Jumper

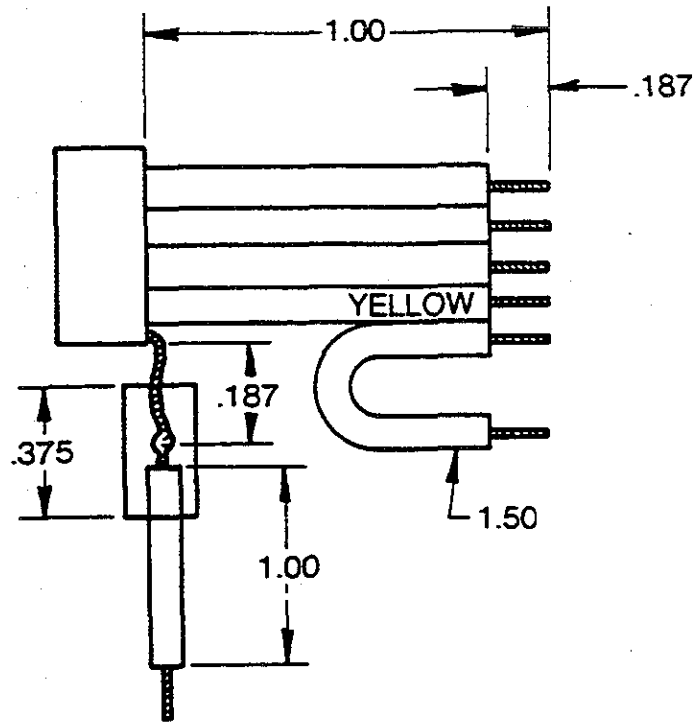


Figure 11-3 Tocotransducer Cable Plug Replacement

Table 11-3. Tocotransducer Plug (White) Pin Connections

PIN NUMBER	PIN LENGTH	I.D.	WIRE COLOR
1	Short	+Press	Red
2	Short	–Press	White
3	Short		—
4	Short	+4 V	Blue
5	Short		—
6	Short	Reference/Enable	#30 AWG Yellow and Green Jumper
7	Long	Shield Ground	#24 AWG Green
8	Short		—
9	Short		—
10	Short		—
11	Short		—
12	Short	TOCO Enable	#30 AWG Green Jumper

Tocotransducer Disassembly

To remove the nameplate, use a screwdriver to remove the center screw. Once the nameplate is removed, remove the four screws which fasten together the top cover and base.

> **NOTE:** It is not necessary to remove top cover for calibration since adjustments can be made through holes in the cover. Refer to *Section 6, Calibration* for tocotransducer calibration instructions.

Leg Plate Plug Replacement

1. Obtain leg plate plug replacement kit, Corometrics Part No. 6158F.
2. Refer to the section, *Transducer Plug Replacement*, and perform steps 1 through 4.
3. Strip back insulation and prepare cable wires. Shield wires and jumper wire as depicted in Figure 11-4.

⚠ **CAUTION:** Read the following precautions before proceeding:

- Slide shrink tubing on cable after completing step 2, above.
- After stripping back outer jacket and braid, take notice of black covering. This is a conductive layer which must be stripped back to outer jacket.
- Identify each cable as it is stripped since colors will be difficult to determine once the sleeving contracts.
- Avoid excessive heat when tinning ends and soldering braids since the polyethylene inner insulation melts easily.

4. Refer to Table 11-4 for pin connections.
5. Solder Ground pin (longer pin) to blue jumper wire.
6. Solder other end of blue jumper to ECG Enable pin.
7. Solder remaining wires to their respective pins.
8. Complete assembly of plug as outlined in the section, *Transducer Plug Replacement*, and perform steps 5 through 9.

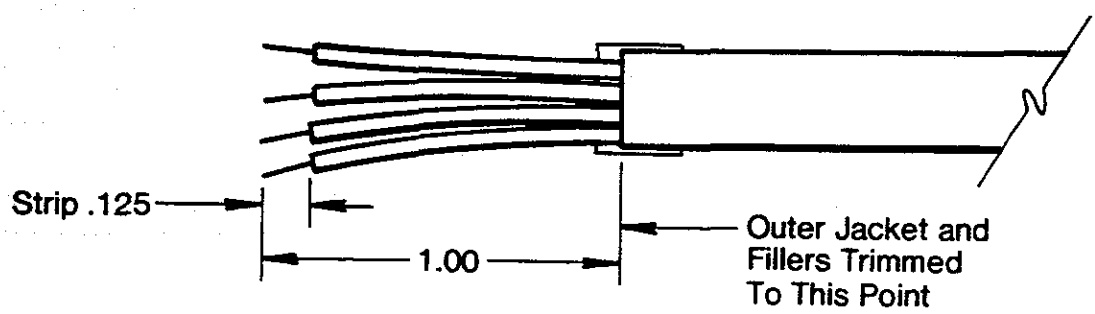


Figure 11-4. Leg Plate Cable and Plug Replacement

Table 11-4. Leg Plate Plug (Grey) Pin Connections

PIN NUMBER	PIN LENGTH	I.D.	WIRE COLOR
1	Short		—
2	Short	ECG Enable	Blue Jumper
3	Long	Ground	Blue Jumper
4	Short		—
5	Short		—
6	Short	LA (red terminal)	White/Black
7	Short	RA (green terminal)	White
8	Short	Shield	#26 AWG Green
9	Short		—
10	Short		—
11	Short		—
12	Short	RL (plate)	White/Red

MECG Transducer Cable and Plug Replacement

1. Obtain MECG plug replacement kit, Corometrics Part No. 6158F.
2. Refer to the section, *Transducer Plug Replacement*, and perform steps 1 through 4.
3. Strip back insulation and prepare cable wires, shield wires, and jumper wire as shown in Figure 11-5.

⚠ **CAUTION:** Read the following precautions before proceeding:

- Slide shrink tubing on cable after completing step 2, above.
- Identify each cable as it is stripped since colors will be difficult to determine once the sleeving contracts.
- Avoid excess heat when tinning ends and soldering braids since the polyethylene inner insulation melts very easily.

4. Refer to Table 11-5 for pin connections.
5. Solder Ground pin (longer pin) to the blue jumper wire.
6. Solder other end of the blue jumper to the MECG Enable pin.
7. Solder remaining wires to their respective shorter pins.
8. Complete assembly of plug as outline in the section, *Transducer Plug Replacement*, and perform steps 5 through 9.

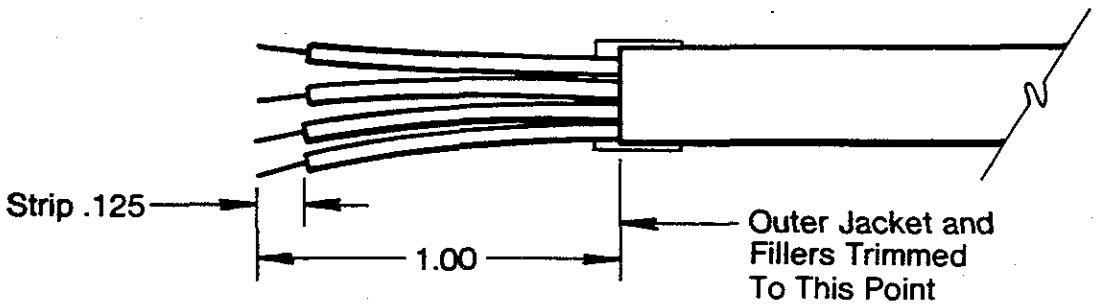


Figure 11-5. MECG Cable and Plug Replacement

Table 11-5. MECG Plug (Grey) Pin Connections

PIN NUMBER	PIN LENGTH	I.D.	WIRE COLOR
1	Short		—
2	Short		—
3	Long	Ground	Blue Jumper
4	Short	MECG Enable	Blue
5	Short		—
6	Short	LA (black terminal)	Brown
7	Short	RA (white terminal)	White
8	Short	Shield	#26 AWG Green
9	Short		—
10	Short		—
11	Short		—
12	Short	RL (green terminal)	Red

Strain-Gauge Plug Replacement

NOTE: The strain gauge is open to atmospheric pressure via a vented tube in the plug end of the cable. Consequently, when a plug is installed, the patency of the tube must be insured. Also, at the time of manufacture, the strain relief is crimped in a special fixture that prevents the tube from being constricted. When half-shells are assembled, hot-melt glue is injected into each of the two potting holes of the strain relief recess so the recess is filled but does not enter the rest of the connector where the vent tube is located.

1. Obtain a strain-gauge plug replacement kit, Corometrics Part No. 6158K.
2. Refer to the section, *Transducer Plug Replacement*, and perform steps 1 through 4.
3. Prepare cable as illustrated in Figure 11-6.
4. Refer to Table 11-6 for pin connections.
5. Solder the Shield Ground pin (longer pin) to the shield braid.
6. Solder the remaining wires to their respective short pins.
7. Refer to the section, *Transducer Plug Replacement*, and perform steps 5 through 9.
8. Inject hot-melt glue into strain relief recess.
9. Slip plastic ring over half-shells and slide gripper over back of half-shells. This completes the strain-gauge plug replacement procedures.

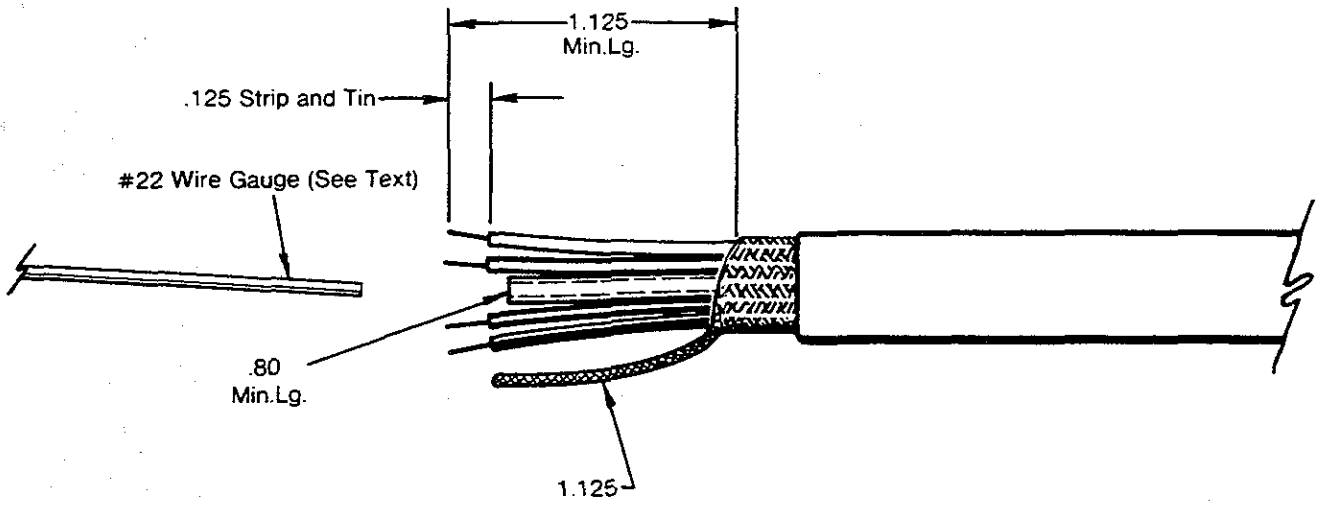


Figure 11-6. Strain Gauge Plug Replacement

Table 11-6. Strain Gauge Plug (White) Pin Connections

PIN NUMBER	PIN LENGTH	I.D.	WIRE COLOR
1	Short	+Press	Yellow
2	Short	-Press	Blue
3	Short		—
4	Short	+4 V	Red
5	Short		—
6	Short	Reference	White
7*	Long	Shield Ground	Bus Wire
8	Short		—
9	Short		—
10	Short		—
11*	Short		—
12	Short		—

* *Some strain gauges are manufactured with a jumper wire connected from pin 7 to pin 11.*

REAR PANEL FECG SIMULATOR

The Model 118 includes a rear panel mounted leg plate tester jack which is connected to an internal FECG simulator. The simulator continuously outputs a 500 µV, 120 BPM simulated fetal R-wave and can be used to verify leg plate wiring integrity, as well as the preamplifier, ECG processing, and cardiotachometer circuitry. Use the following procedure:

1. Connect the leg plate transducer plug to the corresponding color-coded **ECG** connector on the front panel of the monitor.

2. Insert the leg plate in the rear panel **LEG PLATE TESTER** jack. Hold the leg plate in place, flat against the unit.

3. After a short stabilization period, a reading of 120 BPM ± 1 BPM should appear in one of the heart rate displays. Failure of the Model 118 Fetal/ Maternal Monitor to count heart rate under this condition indicates a malfunction in one of the following areas:

   - Broken leg plate cable or connector wires
   - Malfunctioning front panel ECG connector harness
   - Defective FECG preamplifier and/or QRS detector circuitry (Multifunction Board, No. 7931)
   - Defective Main CPU cardiotachometer circuitry (DSP Board, No. 7937)
   - Missing 36 kHz clock signal (Multifunction Board, No. 7931)

When the monitor fails to properly count heart rate with the leg plate properly connected to the tester, first check the leg plate cable wire continuity. This is the first step in troubleshooting a direct ECG mode malfunction since the most likely cause would be a broken leg plate cable wire. If the leg plate is found to be functional, observation of the Event Trigger LED mounted on the DSP Board will indicate the unit's analog ECG circuitry is functional by flashing at 120 BPM. (This LED is the third from the left in the group of four adjacent LEDs, when looking at the component side of the board.) If the Event Trigger LED does not flash, a malfunction is indicated in the FECG preamplifier, QRS detector circuitry, front panel harness, or on the FECG enable circuitry. Consistent flashing of this LED in the absence of counting suggests a defective DSP Board.

MODELS 2115 AND 2116/2116B — THEORIES OF OPERATION

This section of the manual addresses the Model 118's two optional external Data Entry Systems; Models 2115 and 2116/2116B.

> **NOTE:** The Model 118 recorder must be running in order for the Model 2115 or Model 2116/2116B to function correctly.

MODEL 2115 DATA ENTRY SYSTEM

The Model 2115 Data Entry System is an option that plugs into the J103 rear panel connector of the Model 118. The 2115 option is a 16-key, membrane type keypad designed to print messages and data on the Model 118 strip chart recorder paper. The messages and data are displayed the Model 2115's sixteen character LCD before being printed.

Model 2115 Messages

The Model 2115 provides 13 function keys, each assigned to printing the following predetermined messages:

- Blood Pressure
- Vaginal Exam
- Position Change
- Temperature
- Rupture of Membranes (ROM)
- Oxytocin
- Pulse
- pH
- IV
- Respiration
- Fetal Movement (FM)
- Oxygen
- Medication

In addition, an event mark ↑ can also be printed.

Model 2115 Subassemblies

The Model 2115 Data Entry System consists of the following five sub-assemblies:

- Processor Board (No. 5809)
- Keypad Composite (No. 5840AA)
- Auxiliary Board (No. 5813A)
- LCD Display Unit (No. 390050)
- Main Cable Assembly (No. 5959A)

Model 2115 Processor Description

All data and control operations are performed by the hardware and firmware (ROM) located on the Processor Board (No. 5809). This includes communications between the keypad and the Model 118 Fetal/Maternal Monitor and the keypad and the LCD display. In addition, the processor board also contains and executes test routines described later in this section.

After power-up the system processor (U1) initializes the LCD display by:

- setting the display mode;
- loading the special display characters into the display RAM;
- clearing the display.

Model 2115 Power-Up Test Routine

After initializing the LCD display, the processor begins a power-up test routine. This routine places the WAIT message on the display. After displaying this message, the processor samples the BUSY line (U1, pin 6) from the Model 118. If the line is a logic low, the Model 2115 remains in a loop for this line to go high.

After the BUSY line is sensed high, the following sequence occurs:

- The routine tests the system RAM and the link to the Model 118 Fetal/Maternal Monitor. The link test is initiated by sending a test message (00H) to the Model 118.
- The Model 2115 then waits for the Model 118 to acknowledge the message.
- After detecting the acknowledge, the Model 2115 waits approximately 60 µs to allow the Model 118 time to process the test message.
- The Model 2115 tests the status of the INVLD line U1, (pin 39).

A logic low on this line indicates that the message sent was determined to be incorrect. If this happens, the Model 2115 displays an ERROR 3 message and enters a halted state. To clear this error, the Model 2115 must be unplugged from the back of the Model 118 and reinserted into its socket.

NOTE: ERROR 1 indicates the failure of the 118 to accept data during the mainline routine. ERROR 2 indicates the failure of the U1 RAM which requires its replacement.

If the INVLD line does not go low following the 60 µs delay, the Model 2115 assumes the correct message was received and responds by issuing the END OF STRING (EOS) message (10H). After sending the EOS message, the Model 2115 exits the test routine (all messages sent to the Model 118 must be terminated with the EOS byte to indicate that the transfer is complete).

Model 2115 Functional Description

Upon successful exit from the test routine, the Model 2115 displays a READY message to the user to indicate the system is operational. Once in the ready state, the system processor begins the scan portion of the software. During this section of the program, the Model 2115 scans the keypad looking for a key depression. If no key depression is detected, the routine tests the status of the BUSY line. If the BUSY line is low, the BUSY routine is called. In the BUSY routine, the processor monitors the status of both the Mark Enter key and the BUSY line while displaying the WAIT message. During the BUSY routine, the Model 2115 is capable of sending only event marks to the Model 118.

NOTE: The event marks are printed only if the Model 118 recorder is activated.

As long as the BUSY line remains low, the Model 2115 remains in the BUSY state. When the BUSY line is brought high, the BUSY routine is exited and the READY message appears.

MODEL 2116/2116B DATA ENTRY SYSTEM

The Model 2116/2116B Data Entry System is designed to print messages and data on the strip chart of the Model 118 Fetal/Maternal Monitor. The keyboard consists of 53 keys by which the user can employ the FREE TEXT MODE for entering comprehensive information or the FIXED TEXT MODE for easy entry of commonly used medical terms, patient parameters, medical procedures, and drug-related information. All data appears on a 40-character LCD at the top of the keyboard for review prior to entry or printing.

Model 2116/2116B Subassemblies

The Model 2116/2116B Data Entry System consists of the following sub-assemblies:

- Processor Board (No. 6180A)
- Keyboard Composite (No. 6928AA)
- LCD Display Unit (No. 7064A)
- Main Cable Assembly (No. 7069A)

Model 2116/2116B Processor Description

The Processor Board (No. 6180A) contains the circuitry required to control the function of the Model 2116/2116B. It is an 8749H processor based system. The 8749H is a single 40-pin chip containing a processor, ROM, RAM, and I/O ports. This processor is responsible for the following three major functions:

- scanning the 53-microkey keyboard for any key closures;
- communicating with the 40-character LCD display;
- communicating with the Model 118 Fetal/Maternal Monitor.

Three additional chips support the 8749H in its tasks: the 74LS157 quad dual-input multiplexor expands the number of I/O ports available to the 8749; a 74LS138 decoder serves as the driver for scanning the keyboard;

and a 74LS151 8-input multiplexor senses which key is depressed. In addition to these chips, a 74LS05 hex inverter package is used to provide inverters in two places: U1, an ICL7660 voltage converter provides the –5 V necessary to bias the LCD display and U7 provides the 120 VAC needed to drive the LCD backlight.

Model 2116/2116B Functional Description

The RESET signal on pin 3 of J3 is an active high signal coming from the Model 118. By inverting this line with U2 (pins 12, 13) an active low reset signal is provided to the RESET/input of the 8749H. In addition to the reset signal from the Model 118, the 8749H uses a 1 µF capacitor (C7) to provide a power-up reset signal.

After a RESET has occurred, the Model 2116/2116B begins its power up sequence by setting the display mode for the LCD, loading the special characters into the display, and clearing the display.

Once these operations have been completed, the 8749H (U4) places a BUSY message in the LCD and begins its power-up tests. It begins by testing the BUSY/ line from the Model 118 through multiplexor U3 (pin 6). If this line is active, the processor waits in a loop for the line to go inactive. Once the transition occurs, the processor tests the link between the Model 2116/2116B and the Model 118 as follows:

- The data "5H" is placed on the data lines to the Model 118.
- The nibble is strobed into the Model 118 by toggling the STB/line.
- The keyboard waits for the recorder to acknowledge the byte.
- After the recorder has acknowledged the byte, the ERROR/line is checked to ensure that the byte was received correctly.

If no error is detected, the cycle repeats with the following data; AH, 9H, and 0H.

> **NOTE:** All byte transmissions to the monitor are done by transmitting the byte as two nibbles: high nibble first, then low nibble.

If no errors occur during the link test, the WAIT message is removed from the display and a LINK OK message appears for approximately 2 seconds. After the 2-second delay, this message is removed and a cursor appears at the left margin of the display.

If an error is detected, the WAIT message is replaced by a LINK ERROR message and the keyboard is placed into a tight loop preventing any further functioning. Once the power-up test has successfully been completed, the display shows the cursor at the left margin and the keyboard is ready to process key depressions. The process scans the keyboard by placing a scan code (0 to 7) on the address pins of U5 (pins 1, 2, and 3). This code is decoded by U5 to produce a logic 0 on one of the 8 keyboard scan lines (U5 pins 7 and 9-15) Diodes D1-D8 are used to prevent one output logic 0 from affecting the other outputs if multiple keys happen to be depressed. Once the scan line has been selected, depressed keys are sensed by sequencing through the eight return lines using multiplexor U6. By addressing U6 with a code on pins 9, 10, and 11, the state of the keyboard return lines can be sensed on pin 5 of U6. This scanning process is repeated until all lines have been scanned. If a key is detected while scanning, the state of the shift keys is also checked by reading the state of the SHIFT/ line (U3, pin 13). The combination of the depressed key and the state of the SHIFT/ line provides the unique code used by the processor to determine the appropriate action. After a message has been built by a series of key depressions, the Enter key is used to send the message to the monitor. Once this key is depressed, the message is sent in nibble form to the Model 118 and the ERROR/ line monitored to ensure the message is sent out correctly. If an error is detected, the entire message is re-sent. If three failures of a single message are detected, MESSAGE ERROR is displayed and the message aborted.

Throughout all scanning, three additional lines are monitored. These are the BUSY/ line from the Model 118, the MARK IN/ line from the keyboard, and the TEST signal from pushbutton SW1.

If the BUSY/ line is detected low, the keyboard displays the WAIT message in the display and stops all keyboard scanning except for the detection oft he MARK IN/ line. This line goes low whenever the 118 cannot accept any more messages either because all printing lines are used, or the recorder has been turned off.

The MARK IN/ line (U3, pin 14) goes low when the user depresses the [Mark] key on the keyboard. When this happens, the display is cleared and an EVENT MARKER message is displayed for 2 seconds. Also, the MARK/ line to the Model 118 is lowered for those two seconds. After the two seconds has elapsed, any message displayed prior to the [Mark] key being depressed is restored.

The **Test** switch is used to activate the internal test of the keyboard. When the pushbutton is depressed, the display is cleared and a menu of tests appears in the display. The tests are selected by pressing the number of the desired test. The tests are listed in Table 12-1.

Table 12-1. Model 2116/2116B Self-Test

TEST NUMBER	TEST NAME	TEST DESCRIPTION
1	ROM Test	A checksum is performed on a section of the ROM to ensure its integrity.
2	RAM Test	All RAM locations are checked and verified.
3	Display Test	A pattern of characters is displayed providing verification that all dots in the display are functional and all data lines to the display are working properly.
4	Link Test	A test pattern similar to the power-up test is sent to the Model 118 Fetal/Maternal Monitor to check the connection integrity.
5	Exit	This selection terminates the test mode and returns the keyboard to the functional mode.

EXTERNAL DEVICE INTERFACING

The Model 118 contains built-in communications hardware and software that allow connection of the Model 118 to optional peripheral equipment. Three communication ports are provided:

- J108 Connector: COROLAN Interface
- J109 Connector: RS-232C Serial Interface
- J110 Connector: RS-232C Serial Interface

J108, COROLAN INTERFACE PORT

The COROLAN connector, J108, is specifically used to connect the Model 118 as a device on a COROLAN network. COROLAN is Corometrics' proprietary local area network signal standard which connects fetal monitors to a Corometrics MONARCH 8000 Obstetrical Management and Archival System or a Quantitative Medicine Quantitative Sentinel System. Through this interface, the Model 118 supplies information such as heart rate and uterine activity data, monitoring modes, event marks, internal status information, and messages from either the Models 2115 or 2116 Data Entry Systems. For detailed information on connecting to the Corometrics MONARCH 8000 System, refer to the Systems Pre-Installation Manual (P/N 1279AA) and Systems Installation Manual (P/N 1280AA). For detailed information on connecting to the Quantitative Medicine Quantitative Sentinel System, refer to the QS / COROLAN Hospital Pre-Installation Guidelines Manual (P/N 11263AA).

J109 AND J110, RS-232C SERIAL INTERFACE PORTS

The two serial interface ports, J109 and J110, allow connecting the Model 118 to devices supporting the RS-232C standard of communication. Through this interface, the Model 118 supplies information such as heart rate and uterine activity data, monitoring modes, event marks, internal status information , and messages from either the Model 2115 or 2116 Data Entry Systems. The serial RS-232C ports can be configured for connection to blood pressure monitors, pulse oximeters, external modems, printers, and various computer systems.

The following information must be conveyed to the Model 118 Monitor for the specific device being attached: baud rate, parity, and communication mode. These items are configured through Service Screen #2.

Accessing and Using Service Screen #2

To access and configure Service Screen #2:

1. Power on the Model 118 while depressing and holding the **Test** pushbutton. Service Screen #1 is automatically displayed.

   NOTE: If Service Screen #1 does not appear, refer to *Section 5, Setup Procedures* for information on enabling the Service Mode screens.

2. Press the **Setup** pushbutton once to display Service Screen #2, shown in Figure 13-1.

	J110	J109
BAUD RATE	▶1200	600
PARITY	NONE	NONE
MODE	OHM/NELL/555	CRITIKON/556

Figure 13-1. Service Screen #2

3. Use the **Select** pushbutton to move the cursor ▶ between fields for baud rate, parity, and mode. There are two columns, one for the J109 connector and one for the J110 connector.

4. Use the △▽ pushbuttons to cycle through the available choices in a field. The options for baud rate are: 300, 600, 1200, 2400, 4800, and 9600 bps. The options for parity are NONE, ODD, and EVEN. The options for mode are: 115 UPDATE, 115 XMIT/RCV, ASCII INPUT, SPECTRA-TEL, CRITIKON/556, OHM/NELL/555, and DATASCOPE.

5. Depress **Setup** to display a different Service Mode Screen; *or* press **Record** or **Test** to exit the Service Mode.

Cabling Information

Model 118 Connector. The Model 118's J109 and J110 RS-232C Ports each use a 9-pin, female D-style connector, shown in Figure 13-2.

Cable Distance. The RS-232C Interface supplied with the Model 118 is capable of operating over varying distances depending upon the data rate used and whether the cabling is shielded or unshielded. Table 13-1 summarizes the maximum distances between the Model 118 and an external computer.

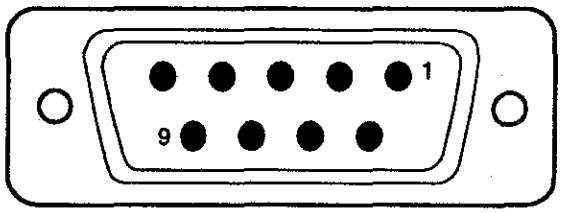


Figure 13-2. Model 118 RS-232C Connector

Table 13-1. Cable Lengths

DATA TRANSMISSION RATE	DISTANCE USING UNSHIELDED CABLE	DISTANCE USING SHIELDED CABLE
9600 bps	250 feet	250 feet
4800 bps	250 feet	1000 feet
2400 bps	500 feet	1000 feet
1200 bps	3000 feet	3000 feet
300 bps	3000 feet	5000 feet

Data Terminal Equipment Cabling. When the Model 118 is directly connected to another Data Terminal Equipment (DTE) device, a standard null-modem cable is required as shown in Figure 13-3. Under conditions where the Model 118 is directly connected to another DTE which does not support the DTR signal, then a special null-modem cable is required as shown in Figure 13-4.

MODEL 118 SIDE		DATA TERMINAL EQUIPMENT (DTE) SIDE		
9-PIN	SIGNAL NAME	SIGNAL NAME	25-PIN	9 PIN
9	RI*	RI	22	9
3	TXD	TXD	2	3
2	RXD	RXD	3	2
7	RTS	RTS	4	7
8	CTS	CTS	5	8
6	DSR†	DSR	6	6
1	DCD§	DCD	8	1
4	DTR	DTR	20	4
5	GND	GND	7	5

**RI is a signal that is not supported by the Model 118's J109 and J110 RS-232C Ports.*
†DSR is supported by the Model 118's J109 RS-232C Port. It is not supported by the Model 118's J110 RS-232C Port.
§DCD is a signal that is not supported by the Model 118's J109 and J110 RS-232C Ports.

Figure 13-3. Standard Null-Modem Cable

MODEL 118 SIDE		DATA TERMINAL EQUIPMENT (DTE) SIDE		
9-PIN	SIGNAL NAME	SIGNAL NAME	25-PIN	9 PIN
9	RI*	RI	22	9
3	TXD	TXD	2	3
2	RXD	RXD	3	2
7	RTS	RTS	4	7
8	CTS	CTS	5	8
6	DSR†	DSR	6	6
1	DCD§	DCD	8	1
4	DTR	DTR	20	4
5	GND	GND	7	5

**RI is a signal that is not supported by the Model 118's J109 and J110 RS-232C Ports.*
†DSR is supported by the Model 118's J109 RS-232C Port. It is not supported by the Model 118's J110 RS-232C Port.
§DCD is a signal that is not supported by the Model 118's J109 and J110 RS-232C Ports.

Figure 13-4. Special Null-Modem Cable

Data Communications Equipment Cabling. When the Model 118 is connected to a Data Communications Equipment (DCE) device — a modem, a standard normal-modem cable is required as shown in Figure 13-5. If the Model 118 is connected to a DCE which does not have modem control lines, then the cable shown in Figure 13-6 is required.

MODEL 118 SIDE		DATA TERMINAL EQUIPMENT (DTE) SIDE		
9-PIN	SIGNAL NAME	SIGNAL NAME	25-PIN	9 PIN
9	RI*	RI	22	9
3	TXD	TXD	2	3
2	RXD	RXD	3	2
7	RTS	RTS	4	7
8	CTS	CTS	5	8
6	DSR†	DSR	6	6
1	DCD§	DCD	8	1
4	DTR	DTR	20	4
5	GND	GND	7	5

**RI is a signal that is not supported by the Model 118's J109 and J110 RS-232C Ports.*
†DSR is supported by the Model 118's J109 RS-232C Port. It is not supported by the Model 118's J110 RS-232C Port.
§DCD is a signal that is not supported by the Model 118's J109 and J110 RS-232C Ports.

Figure 13-5. Normal-Modem Cable

MODEL 118 SIDE		DATA TERMINAL EQUIPMENT (DTE) SIDE		
9-PIN	SIGNAL NAME	SIGNAL NAME	25-PIN	9 PIN
9	RI*	RI	22	9
3	TXD	TXD	2	3
2	RXD	RXD	3	2
7	RTS	RTS	4	7
8	CTS	CTS	5	8
6	DSR†	DSR	6	6
1	DCD§	DCD	8	1
4	DTR	DTR	20	4
5	GND	GND	7	5

**RI is a signal that is not supported by the Model 118's J109 and J110 RS-232C Ports.*
†DSR is supported by the Model 118's J109 RS-232C Port. It is not supported by the Model 118's J110 RS-232C Port.
§DCD is a signal that is not supported by the Model 118's J109 and J110 RS-232C Ports.

Figure 13-6. Special DCE Interface Cable

Connecting to a Peripheral Device Using the Model 115 Communication Mode

There are two Model 115 Communication Modes: Update Mode and Transmit/Receive Mode. These options provide backward-compatibility so that the Model 118 can operate in a Model 115-compatible communication mode. When the Model 115 Fetal Monitor was released, many customers developed their own interfaces for communicating with the monitor. Setting the Model 118 to one of these communication modes allows these users to use their existing interfaces with the Model 118 Maternal/Fetal Monitor as well. The following control signals are supported:

Data Terminal Ready (DTR). This output line is asserted (+12 V for J109; +15 V for J110) whenever the Model 118 is on and operating; it can be used to determine whether the Model 118 is powered on.

Request to Send (RTS). This output line is asserted (+12 V) whenever the Model 118 is on and operating; it can be used to determine whether the Model 118 is powered on.

Transmit Data (TXD). This output line provides the serial data sent to the external computer from the Model 118.

Data Set Ready (DSR). This input line must be asserted in order to enable the transmission of data from the Model 118. The line may be asserted locally by tying this line to the DTR line on the Model 118; or it may also be connected to the DTR line of the external computer (providing the external computer asserts DTR). If a modem is used, this line should be tied to the DSR line of the modem.

> **NOTE:** The DSR signal is supported by the Model 118's J109 Port but is not supported by the J110 Port.

Clear to Send (CTS). This input line must be asserted in order to enable the transmission of data from the Model 118. Under conditions where no modem is used, the line can be tied to the RTS line of the Model 118. If a modem is used, this line should be tied to the CTS line of the modem.

Receive Data (RXD). This input line provides the serial data sent from the external computer to the Model 118.

Standard RS-232C rules apply:

- When direct connection is made between the Model 118 and another Data Terminal Equipment (DTE), a standard null-modem cable must be used.
- Under conditions where the Model 118 is connecting to a DTE which does not support the DTR signal, a special null-modem cable is required which ties the DTR and DSR lines together at both ends.
- When an indirect connection is made, using a modem, the Model 118 requires a normal-modem cable.
- Under conditions where the Model 118 is connecting to a DCE which does not have modem control lines, a special DCE cable is required in which the RTS and CTS lines are tied together at both ends and the DSR and DTR lines are tied together at both ends.

Model 115 Update Mode

General. In the Model 115 Update Mode, all information is transmitted from the Model 118 as soon as the information becomes available to the Peripheral Board (No. 10621). Heart rate data is transmitted on a beat-to-beat basis. Uterine activity is transmitted eight times per second. Modes are transmitted during recorder startup and whenever a mode change occurs. Keypad and keyboard messages are sent as they are received. Event marks are transmitted each time the **Mark** pushbutton is depressed. In the Model 115 Update Mode The Model 118 will not respond to any information sent from the external computer.

Configuring the Model 118. Refer to the previous section, *Accessing and Using Service Screen #2*, and configure the monitor for the 115 UPDATE MODE. The baud rate and parity must match the external computer.

Startup Procedures. After power is applied to the Model 118, the RS-232C port (J109 or J110), is initialized with the DTR and RTS lines asserted. The Model 118 will send three START OF TEXT (STX) characters (02H) to allow the external computer to synchronize itself to the Model 118. Due to startup transients on the TXD line, it is possible that the external computer will not detect all three of these characters as valid. As a result, the external computer should wait until it receives the last STX character (valid and invalid combined) before processing any information from the Model 118 or before transmitting any information to the Model 118.

Data Format. The format of the information transmitted from the Model 118 to the external computer is shown in Figure 13-7. The definitions of the bytes are as follows:

Monitor Type: This 1-byte ASCII value indicates the type of monitor sending the information. While the Model 115 was selectable between 0 (30H) for single-cardiotach and 1 (31H) for dual-cardiotach, the Model 116 and Model 118 are set at a fixed value of 2 (32H).

Response Type: This 1-byte value indicates the type of information being sent from the Model 118 as shown in Table 13-2.

Monitor ID: This 1-byte ASCII value indicates the ID number of the monitor information. The value of this byte is user-selectable in the Model 115; however, for the Model 116 and Model 118 the Monitor ID is set at a fixed value of 0 (30H).

Data Field: This field of n-bytes contains the actual data sent by the Model 118 to the external computer. The contents of this field for each response is given below:

Event Mark: The data field is empty whenever the **Mark** pushbutton is depressed.

Heart Rate: Two or three ASCII characters representing the value of heart rate. A value of 00 indicates a penlift condition.

Uterine Activity: Two or three ASCII characters representing the value of uterine activity. A value of 128 indicates a penlift condition.

Modes: Two ASCII characters indicating the mode. The first character is the combined mode of both heart rates according to Table 13-3. The second character is the mode for the uterine activity channel as listed in Table 13-4. Some of these modes differ from the original Model 115 modes (PHONO for example).

2115/2116 Messages: This field of n-bytes contains actual data making up the messages sent to the Model 118 by the Model 2115 or Model 2116 Data Entry Systems.

End of Text. A 1-byte field containing the value 03H.

Limitations of the Model 115 Update Mode. The only restriction on the information transmitted during the Model 115 Update Mode occurs when the baud rate is set to 300 bps. Under this condition, the Model 118 will not send any heart rate or uterine activity data. This restriction is due to the fact that at this baud rate it is impossible to transmit this information on a timely basis.

Error Conditions. In the Model 115 Update Mode, the only errors that can occur are transmission errors. These errors may be detected by the external computer as parity errors, framing errors (no valid stop bit), or invalid characters. There is no facility in the Model 118 to re-transmit any information found to contain an error. It is therefore up to the user to decide what action to take as a result of an error.

Figure 13-7. Transmitted Data Format — Model 115 Update Mode and Transmit/Receive Mode

Table 13-2. Response Type — Model 115 Update Mode

RESPONSE TYPE	ASCII CODE	HEXADECIMAL
Heart Rate 1	`	60
Uterine Activity	a	61
Modes	b	62
Model 2115/2116 Messsages	c	63
Event Mark	d	64
Heart Rate 2	e	65

Table 13-3. Heart Rate Modes — Model 115 Update Mode

HR1 MODE	HR2 MODE	ASCII CODE	HEXADECIMAL
INOP	—	0	30
FECG	—	1	31
US	—	2	32
US	MECG	5	35
US	FECG	9	39
US	US2	;	3B
FECG	US	<	3C
INOP	MECG	=	3D

Table 13-4. Uterine Activity Modes — Model 115 Update Mode

UA MODE	ASCII CODE	HEXADECIMAL
INOP	0	30
TOCO	1	31
IUP	2	32

Model 115 Transmit / Receive Mode

General. In the Model 115 Transmit / Receive Mode, the Model 118 will send only the information that is requested by the external computer. The selection of this information is done by sending a request stream to the Model 118. After processing the request, the Model 118 will then send the selected parameters to the external computer using the Model 115 Update Mode. Therefore the information selected by the external computer will be transmitted each time the parameter changes. The requested parameters may be changed at any time by the computer by sending a new request sequence.

Configuring the Model 118. Refer to the previous section, *Accessing and Using Service Screen #2*, and configure the monitor for 115 XMIT/RCV Mode. The baud rate and parity are dependent on the external computer.

Data Format. The format of the information transmitted from the Model 118 to the external computer is the same as in the Model 115 Update Mode, shown in Figure 13-7. The format of the data requested by the Model 118 from the external computer is shown in Figure 13-8. The definitions of the bytes are as follows:

Monitor Type: This 1-byte ASCII value indicates the type of monitor sending the information. While the Model 115 was selectable between 0 (30H) for single-cardiotach and 1 (31H) for dual-cardiotach, the Model 116 and Model 118 can be set at 0, 1, 2, 3, 4, or 5 because the value is ignored.

Data Field. This 1- to 6-byte field indicates which parameters the external computer wishes to receive. The values for the bytes are given in Table 13-5.

End of Text. A 1-byte field containing the value 03H. If this byte is sent immediately following the Monitor ID, then the Model 118 will cancel transmission of all data.

Figure 13-8. Requested Data Format — Model 115 Transmit/Receive Mode

Table 13-5. Data Field — Model 115 Transmit/Receive Mode

RESPONSE TYPE	ASCII CODE	HEXADECIMAL
Heart Rate 1	`	60
Uterine Activity	a	61
Modes	b	62
Model 2115/2116 Messages	c	63
Event Mark	d	64
Heart Rate 2	e	65

Limitations of the Model 115 Transmit / Receive Mode. The only restriction on the information transmitted during the Model 115 Transmit / Receive Mode occurs when the baud rate is set to 300 bps. Under this condition, the Model 118 will not send any heart rate or uterine activity data, even if the external computer requests such information. This restriction is due to the fact that at this baud rate it is impossible to transmit this information on a timely basis.

Error Conditions. There are two types of errors that can occur during the Model 115 Transmit / Receive Mode. This first type is an error that occurs in the transmission of data from the Model 118 to the external computer. These errors are parity errors, framing errors (no valid stop bit), or invalid characters. The second type of error is the information transmitted from the external computer to the Model 118. Among these errors are parity errors, framing errors, and invalid monitor ID.

Both error types cause the Model 118 to ignore all received data until a valid End of Transmission byte is detected. For this reason, it is suggested that the external computer re-transmit a request sequence if the Model 118 fails to respond properly to the request. Any invalid data during the Data Field of the request is simply ignored and no error condition is set.

Using the Model 118 as an ASCII Text Printer

General. This option provides a means of connecting to a device that is designed to output to a serial printer at a low data rate. It allows the Model 118 to accept ASCII characters in a standard RS-232C serial stream using the XON/XOFF protocol. This option is most useful in clinical research applications where the serial communication port of a PC running PROCOMM PLUS, for example, is used to annotate the strip chart. (Corometrics does not provide any software means for accomplishing this.)

Configuring the Model 118. Refer to the section, *Accessing and Using Service Screen #2*, and configure the monitor for the ASCII INPUT Mode. The baud rate and parity are dependent on the external device.

Connecting the Model 118 to an External NIBP or SpO_2 Monitor

The Model 118 provides the ability to interface with some of the most widely used noninvasive blood pressure monitors and pulse oximeters, providing simultaneous documentation of these maternal parameters on the strip chart. A summary of NIBP and SpO_2 monitors is provided in Table 13-6. This table lists the function of each monitor, the Model 118 Communication Mode settings, the Model 118 baud rate setting, and the required interface cable catalog number.

The maternal values are clearly recorded on the center margin of the chart paper and the time of the reading is indicated with a diamond marker (♦). This unique feature minimizes the need for handwritten annotations.

Under most conditions, blood pressure values print at the time of a reading while oxygen saturations values print every five minutes. However, there are some instances where technical reasons inhibit the Model 118 from printing at the specified intervals.

⚠ **CAUTION:** As with any equipment, turn off the Model 118 and the external NIBP or SpO_2 monitor prior to connecting the two together. Following this procedure avoids damaging the equipment and ensures that any previously stored print data is cleared. This caution applies to all monitors listed in this section.

Table 13-6. External Device Summary

EXTERNAL DEVICE	NIBP	SpO2	MODEL 118 BAUD RATE	INTERCONNECT CABLE CATALOG #		MODEL 118 COMMUNICATION MODE
				1 ft	6 ft	
Corometrics Model 556	Y	Y	600	1424AAO	1424BAO	CRITIKON / 556
Critikon Model 1846	Y	N	600	1415AAO	1415BAO	
Critikon Model 1846SX	Y	N	600	1415AAO	1415BAO	
Critikon Model 1846SX/Oxytrak	Y	Y	600	1415AAO	1415BAO	
Critikon Model 8100	Y	N	600	1420AAO	1420BAO	
Critikon Model 8100T	Y	N	600	1420AAO	1420BAO	
CAS Model 9300	Y	N	4800	1424AAO	1424BAO	OHM / NELL / 555
Corometrics Model 555	Y	N	1200	1415AAO	1415BAO	
Invivo Model 1400	Y	N	1200	1415AAO	1415BAO	
Nellcor Model N-180	N	Y	2400	1424AAO	1424BAO	
Nellcor Model N-200	N	Y	1200	1424AAO	1424BAO	
Ohmeda Model 3700	N	Y	1200	1423AAO	1423BAO	
Ohmeda Model 3740	N	Y	1200	1423AAO	1423BAO	
Novametrix Model 515A	N	Y	1200	—	9867B	
Novametrix Model 520	N	Y	1200	—	9867B	
Datascope Model Accutorr 3	Y	N	1200	1415AAO	1415BAO	DATASCOPE
Datascope Model Accutorr SAT	Y	Y	1200	1415AAO	1415BAO	
Datascope Model Accutorr 4	Y	N	1200	1415AAO	1415BAO	
Datascope Model Accutorr 4SAT	Y	Y	1200	1415AAO	1415BAO	
Datascope Model 3000A	Y	Y	2400	1415AAO	1415BAO	

Note: The Model 118 parity should be set to NONE for all devices.

Note: The baud rates in this chart are recommended baud rates only. You may select any baud rate that is available on the device you are connecting. However, to facilitate interchanging devices, it is recommended that you choose a baud rate that is common to the majority of devices using a selected Model 118 Communication Mode.

General Information. The following bulleted items apply to all external devices being interfaced to the Model 118:

- The Model 118 strip chart recorder must be on in order for NIBP and SpO_2 messages to print.
- The Model 118 parity should be set to NONE for all devices.
- Depression of the **Paper Advance** pushbutton causes a reading to be rejected.
- If an SpO_2 value is discarded because the Model 118 strip chart recorder is off, the next scheduled value will be printed (i.e. 5 minutes from the last attempt).
- Certain combinations of monitors ignore the NIBP pulse value if SpO_2 is functional.
- Some SpO_2 monitors require a waiting period to display and output SpO_2 values after a loss of signal. To compensate for this, the Model 118 will not print an SpO_2 reading if the received value is within 20 seconds of receipt of an invalid reading. This avoids printing SpO_2 values during the waiting period.

This following text describes the specific aspects involved in connecting the various monitors.

Corometrics Model 556 Critical Care Monitor. The Model 556 Critical Care Monitor can be interfaced to the Model 118 to provide a printout of SpO_2 and NIBP values on the Model 118 strip chart. As listed in Table 13-5, the Model 118 baud rate should be set to 600 bps; the required interface cable is Corometrics Catalog #1424AAO/BAO. (The Model 556 also provides values for maternal heart rate, pulse, respiration, two temperatures, two non-invasive pressures, tcPO2, and tcPCO2 for printing on the Model 118 strip chart.)

- Values will print in either a manual or automatic mode as determined by the Model 556. Refer to the Model 118 Operator's Manual, P/N 11266AA for more information concerning the automatic printing time intervals of the Model 556.
- When the Model 556 is in the AUTO mode, parameter measurements from the Model 556 will not be printed if the Model 118 is printing alphanumeric information on all four channels of the strip chart. Once exception to this rule is the taking of an NIBP value; a diamond (♦) marker will be printed and the *latest* NIBP value received from the Model 556 will be printed when a line becomes free. In this case, it may be possible to have more diamonds than NIBP values.
- When the Model 556 is in the MANUAL mode and the [FMS PRINT ON/OFF] softkey is pressed, the values printed represent the most recent parameter measurements. In the case of NIBP, the printed value corresponds to the last time the NIBP measurement was taken.
- If the [FMS PRINT ON/OFF] softkey is pressed and no parameters are being monitored, a diamond (♦) marker will be printed but no parameter measurements will be recorded.

Critikon Models 1846, 1846SX, 1846SX/Oxytrack, 8100, and 8100T. All of these Critikon monitors can be interfaced to the Model 118 to provide a printout of the NIBP values on the Model 118 strip chart; the Model 1846SX/Oxytrack will also provide a printout of the SpO_2 values on the Model 118 strip chart. Consult Table 13-5 for Model 118 baud rate settings and appropriate interface cables.

- The clock on the Critikon Models 1846, 1846SX, and 1846SX/Oxytrack must be set to within 10 minutes of the Model 118 clock. If the clocks are *not* within 10 minutes of each other, the time will print with each blood pressure reading.
- The clock on the Models 8100 and 8100T is ***not*** a real-time clock. Instead, the clock measures elapsed time since the monitor was turned on.
- Due to the storage capabilities of Critikon monitors, it is recommended that power be cycled at the beginning of each data session. This ensures that any previously stored data is cleared.
- When using STAT mode on the Critikon monitor, the Model 118 does not print the time with each reading due to overcrowding on the strip chart. Instead the time is printed once every three to five minutes.
- The Critikon Model 1846SX discards NIBP values after 90 minutes.

- The Critikon Model 1846SX/Oxytrack does *not* discard old NIBP values.

- The Critikon Model 1846SX/Oxytrack will omit the pulse rate with the NIBP reading if SpO_2 is also in use. In other words, the pulse rate from the SpO_2 reading takes priority over the pulse rate from the NIBP reading.

CAS Model 9300 NIBP Monitor. The CAS Model 9300 NIBP Monitor can be interfaced to the Model 118 to provide a printout of NIBP values on the Model 118 strip chart. As listed in Table 13-5, the Model 118 baud rate should be set to 4800 bps; the required interface cable is Corometrics catalog #1424AAO/BAO.

Corometrics Model 555 NIBP Monitor. The Model 555 NIBP Monitor can be interfaced to the Model 118 to provide a printout of NIBP values on the Model 118 strip chart. As listed in Table 13-5, the Model 118 baud rate should be set to 1200 bps; the required interface cable is Corometrics catalog #1415AAO/BAO.

Invivo Model 1400 NIBP Monitor. The Invivo Model 1400 NIBP Monitor can be interfaced to the Model 118 to provide a printout of NIBP values on the Model 118 strip chart. As listed in Table 13-5, the Model 118 baud rate should be set to 1200 bps; the required interface cable is Corometrics catalog #1415AAO/BAO.

- The Invivo Model 1400 must be equipped with the RS-232C option.

Nellcor Model N-180 SpO_2 Monitor. The Nellcor Model N-180 SpO_2 Monitor can be interfaced to the Model 118 to provide a printout of SpO_2 values on the Model 118 strip chart. As listed in Table 13-5, the Model 118 baud rate should be set to 2400 bps; the required interface cable is Corometrics catalog #1424AAO/BAO.

- The Nellcor Model N-180 must be configured in the Computer communications format. Set Switch Section 2 to the Up position. (Refer to the Nellcor Model N-180 Service Manual for more information.)

- The Nellcor Model N-180 must be set to a baud rate of 2400 bps. Set Switch Sections 7 and 8 to the Down position. (Refer to the Nellcor Model N-180 Service Manual for more information.)

Nellcor Model N-200 SpO_2 Monitor. The Nellcor Model N-200 SpO_2 Monitor can be interfaced to the Model 118 to provide a printout of SpO_2 values on the Model 118 strip chart. As listed in Table 13-5, the Model 118 baud rate should be set to 1200 bps; the required interface cable is Corometrics catalog #1424AAO/BAO.

- The Nellcor Model N-200 must be set to the Beat-to-Beat Mode.

Ohmeda Models 3700 and 3740 SpO_2 Monitors. The Ohmeda Models 3700 and 3740 SpO_2 Monitors can be interfaced to the Model 118 to provide a printout of SpO_2 values on the Model 118 strip chart. As listed in Table 13-5, the Model 118 baud rate should be set to 1200 bps; the required interface cable is Corometrics catalog #1423AAO/BAO.

- The Ohmeda Model 3700 has a Print Trend History function. Corometrics does not recommend using this feature when interfacing to the Model 118 since Model 118 could interpret one of the history values as the current reading to be printed. The Model 118 guards against this problem by suspending SpO_2 printing for 10 minutes upon recognition of trend history data, however use of the mode is still not recommended.

- The Ohmeda Models 3700 and 3740 Monitors must be set to the Auto-Output Mode.

Novametrix Models 515A and 520 SpO_2 Monitors. The Novametrix Models 515A and 520 SpO_2 Monitors can be interfaced to the Model 118 to provide a printout of SpO_2 values on the Model 118 strip chart. As listed in Table 13-5, the Model 118 baud rate should be set to 1200 bps; the required interface cable is Corometrics catalog #9867B.

- The Novametrix Models 515A and 520 Monitors must be set to the Full-Format Mode.

Datascope Models Accutorr 3 and Accutorr 4 NIBP Monitors. The Datascope Models Accutorr 3 and Accutorr 4 NIBP Monitors can be interfaced to the Model 118 to provide a printout of NIBP values on the Model 118 strip chart. As listed in Table 13-5, the Model 118 baud rate should be set to 1200 bps; the required interface cable is Corometrics catalog #1415AAO/BAO.

- When turning on a Datascope Model Accutorr 3 or Model Accutorr 4 Monitor, or connecting a monitor to the Model 118, it is possible to print an NIBP reading that is one or two minutes old. Under rare circumstances, a previous reading will print while a new NIBP determination is in progress.

Datascope Models Accutorr 3SAT and Accutorr 4SAT NIBP / SpO_2 Monitors. The Datascope Models Accutorr 3SAT and Accutorr 4SAT Monitors can be interfaced to the Model 118 to provide a printout of NIBP and SpO_2 values on the Model 118 strip chart. As listed in Table 13-5, the Model 118 baud rate should be set to 1200 bps; the required interface cable is Corometrics catalog #1415AAO/BAO.

- The pulse rate printed with the NIBP values may actually be determined by the SpO_2 sensor. (This is the case with the displayed value on the Datascope Model Accutorr 3SAT and Model Accutorr Model 4SAT Monitors.)

Datascope Model 3000A NIBP / SpO_2 Monitor. The Datascope Model 3000A Monitor can be interfaced to the Model 118 to provide a printout of NIBP and SpO_2 values on the Model 118 strip chart. As listed in Table 13-5, the Model 118 baud rate should be set to 2400 bps; the required interface cable is Corometrics catalog #1415AAO/BAO.

SPECIFICATIONS

MODEL 118 MATERNAL / FETAL MONITOR

Power Requirements

Line Voltage:	88–108 VAC	105–130 VAC	193–238 VAC	207–253 VAC	210–250 VAC
Line Frequency:	48–62 Hz	48–62 Hz	48–62 Hz	48–62 Hz	48–62 Hz
Power Consumption (maximum):	100 W	100 W	.4 A	.4 A	.4 A
Line Fuse Rating:	1.5 A (Slow Blow)	1.5 A (Slow Blow)	1.6 A/250 V (TT)	1.6 A/250 V (T or TT*)	1.6 A/250 V (T)

Physical Characteristics

Height:	7.0 in (17.8 cm)
Width:	16.5 in (41.9 cm)
Depth:	17.0 in (43.2 cm)
Weight:	36 lbs (16.5 kg) approx.

Environmental Conditions

	Operating	Storage
Ambient Temperature:	50°F to 104°F (10°C to 40°C)	14°F to 131°F (–10°C to 55°C)
⚠ Relative Humidity:	30% to 70%, non-condensing	0% to 95%, non-condensing
Atmospheric Pressure:	700–1060 mbar (525–795 mmHg)	700–1060 mbar (525–795 mmHg)

Standards

Complies with UL-544 and IEC601-1 specifications.

OPERATING MODES

Direct ECG Mode

Technique:	Peak detecting, beat-to-beat cardiotachometer
Maternal ECG Electrode Type:	Medtronic 1700-003 or equivalent
Heart Rate Counting Range:	30–240 BPM
Heart Rate Resolution:	±1 BPM
Artifact Elimination:	Switch selectable, ±25 BPM artifact rejection
Countable Input Signal Range:	
Fetal:	15 µV to 2 mV peak-to-peak
Maternal:	100 µV to 2 mV peak-to-peak
Offset Voltage Tolerance (Differential):	±300 mVdc maximum
Maximum Common Mode Voltage:	20 V peak-to-peak
Preamplifier Bandwidth:	1–100 Hz
Common Mode Rejection:	
Balanced:	> 120 dB, with patient cable
Unbalanced 5K RA or LA:	> 110 dB
Input Equivalent Noise:	< 10 µV peak-to-peak
Input Impedance:	
Differential:	> 10 MΩ

* *TT for Germany only.*

Direct ECG Mode — *continued*

Mains Frequency Rejection:	> 40 dB
Leakage Current:	< 10 µA at 120 VAC
Isolation, Mains-to-Patient:	> 2 kV
Leg Plate Tester Jack:	Simulated R-Wave at 120±1 BPM
Alarms (audible and visual):	
Limits:	User-selectable high and low maternal heart rate
Technical:	Leads off; asystole

Ultrasound Mode

Technique:	Pulsed Doppler with autocorrelation processing
Transducer Type:	9-crystal
Pulse Repetition Frequency:	
Single Ultrasound Mode:	4 kHz
Dual Ultrasound Mode:	2 kHz
Pulse Duration:	92 µs
Transmitter Frequency:	1.151 MHz
Spatial-Peak Temporal Average Intensity:	I_{spta} < 10 mW/cm²
Heart Rate Counting Range:	50–210 BPM
Leakage Current:	< 10 µA at 120 VAC, transducer isolated
Focal 20 dB Beam Area:	16.6 cm², at a range = 7 cm
Peak Instantaneous Intensity:	1.8 mW/cm²
Peak-Negative Acoustic Pressure:	p < 10.0 kPa

Uterine Activity Mode

	Strain Gauge	Tocotransducer
Range:	0–100 mmHg (0–13.33 kPa)	0–100 relative units
Resolution:	1 mmHg (0.13 kPa)	1 relative unit
Bandwidth:	dc to 3 Hz	dc to 0.5 Hz

Excitation Voltage:	+4.0 Vdc
Zero Set Temperature Drift:	< 0.1 mmHg/°C (0.013 kPa/°C), excluding transducer
Leakage Current:	< 10 µA at 120 VAC, transducer isolated

Maternal Blood Pressure Mode

Technique:	Oscillometric. Microprocessor software eliminates most ambient noise and motion artifact.
Blood Pressure Range:	20–255 mmHg (2.7–34.0 kPa)
Pulse Rate Range:	40–240 BPM
Blood Pressure Accuracy:	±5 mmHg (0.7 kPa) with a standard deviation no greater than 8 mmHg (1.1 kPa)
Pulse Rate Accuracy:	±2 %
Cuff Inflation:	Initial inflation to 160 mmHg (21.3 kPa). Subsequent inflation approximately 30 mmHg (4.0 kPa) greater than the previous systolic pressure.

Maternal Blood Pressure Mode — *continued*

Cuff Deflation:	Automatic.
Safety Features:	Automatic cuff deflation if: cuff pressure exceeds 280 mmHg (37.3 kPa); or measurement time exceeds 90 s; or safety timer detects microprocessor failure. Auto mode minimum 30-second delay from the end of one determination to the beginning of another to allow for venous return.
Display/Record:	Systolic, diastolic,and mean pressure; pulse rate
Alarms (audible and visual):	
Limits:	User-selectable high and low systolic, diastolic, and mean pressures; User-selectable high and low pulse rate
Technical:	Cuff errors, connection errors, insufficient signal, excessive inflation or determination times, overpressure, hose errors, excessive motion, communication problem, or self-test failure
Compliance:	The Model 118's blood pressure module complies with the American National Standard for Electronic or Automated Sphygmomanometers [AAMI/ANSI SP10-1992]. Blood pressure measurements determined with this device are equivalent to those obtained by a trained observer using the cuff/stethoscope method, within the limits prescribed by the American National Standard for Electronic or Automated Sphygmomanometers.

Maternal Pulse Oximetry Mode

Technique:	Spectrophotometry and plethysmography.
Sensor Type:	Nellcor D-25 or D-25L
Saturation Range:	0–100 %
Pulse Rate Range:	20–250 BPM
Saturation Accuracy:	%SpO_2 ±1 standard deviation*:
(with Nellcor D-25 Sensor)	70–100 % ±2 digits
	50–69 % ±3 digits
	0–49 % (unspecified)
Pulse Rate Accuracy:	±3 BPM
Wavelengths:	
Red:	660 nm, nominal
Infrared:	920 nm, nominal
Response Time:	User-selectable: slow, normal, and fast averaging modes.
Alarms (audible and visual):	
Limits:	User-selectable high and low SpO_2; User-selectable high and low pulse rate
Technical:	Sensor errors, connection errors, insufficient signal, excessive motion, communication problem, internal calibration error, or self-test failure.

* *The accuracy of a given oxygen range is valid for only 68% of the data points taken and the remaining 32% of the data points are not accounted in the specification.*

STRIP CHART RECORDER

Heart Rate Scale

	Domestic	International
Chart Width:	7 cm	8 cm
Scaling:	30 BPM/cm	20 BPM/cm
Range:	30–240 BPM	50–210 BPM
Resolution:	1 BPM	1 BPM

Uterine Activity Scale

	Strain Gauge	Tocotransducer
Chart Width:	4 cm	4 cm
Scaling:	25 mmHg/cm (3.33 kPa/cm)	25 relative units/cm
Range:	0–100 mmHg (0–13.33 kPa/cm)	0–100 relative units
Resolution:	1 mmHg (0.133 kPa)	1 relative unit

Pulse Oximetry SpO_2 Scale

	Domestic	International
Chart Width:	4 cm	4 cm
Scaling:	10 %/cm	12.5 %/cm
Range:	60–100 %	50–100 %
Resolution:	1 %	1 %

Recorder Drive

Speeds:	1, 2, and 3 cm/min
Accuracy:	±1 %

Note: Specifications subject to change without notice.

SCHEMATICS AND BLOCK DIAGRAMS

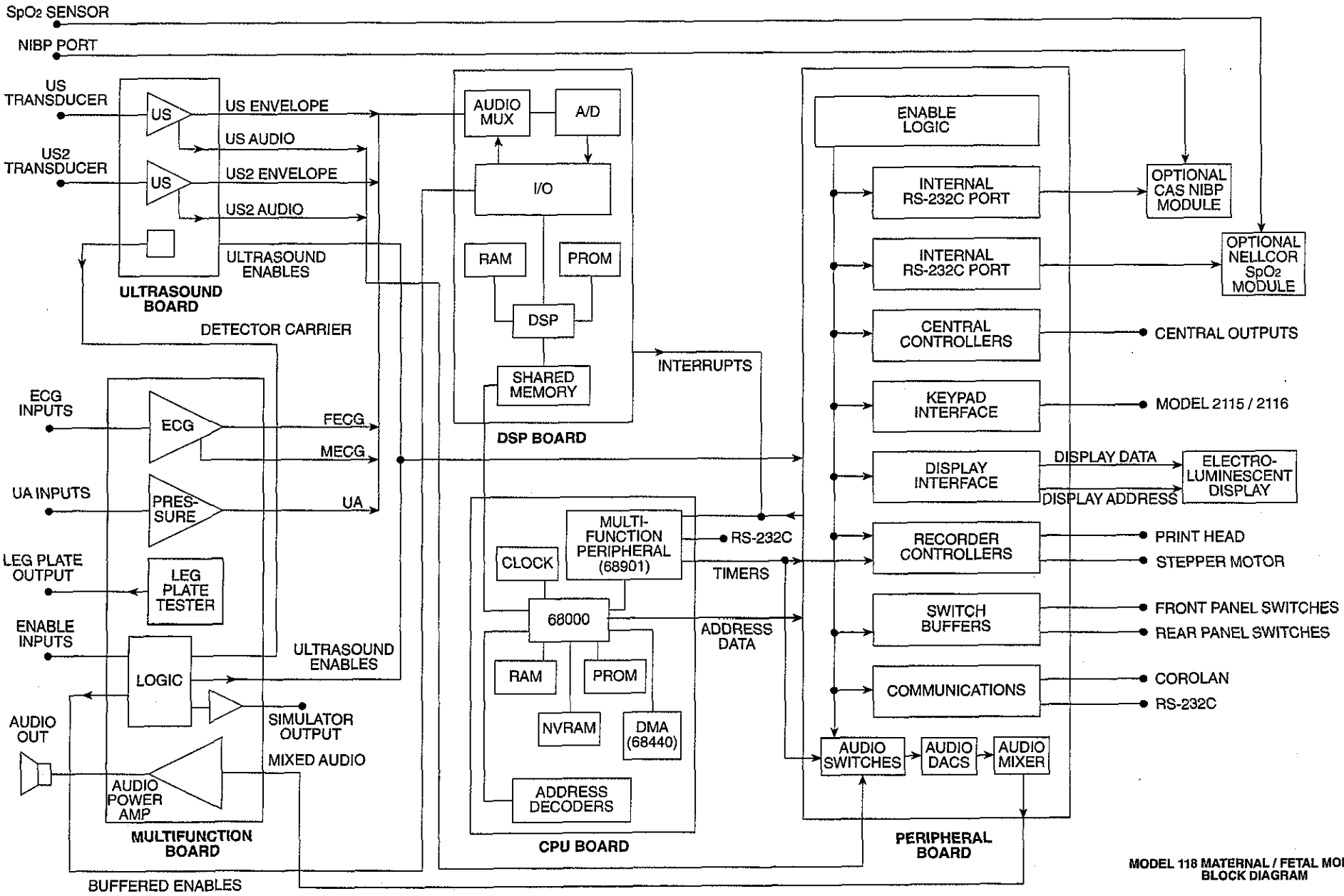
This section of the manual provides the Model 118 Maternal / Fetal Monitor schematics and block diagrams. The schematics and block diagrams are used in conjunction with the associated assembly drawings and parts lists in Section 16 of this manual. A complete listing of all Model 118 Maternal / Fetal Monitor diagrams and schematics is given in the Table of Contents of this manual.

A NOTE ON REFERENCE DOCUMENTATION

The Corometrics Factory makes every effort possible to provide the most up-to-date reference documentation for your Corometrics equipment. However, in special cases involving field installed upgrades, the revision level of a schematic, assembly drawing, or parts list in this manual may not reflect the revision level of your unit's subassemblies. When discrepancies are found, contact the Corometrics Service Department at one of the numbers below.

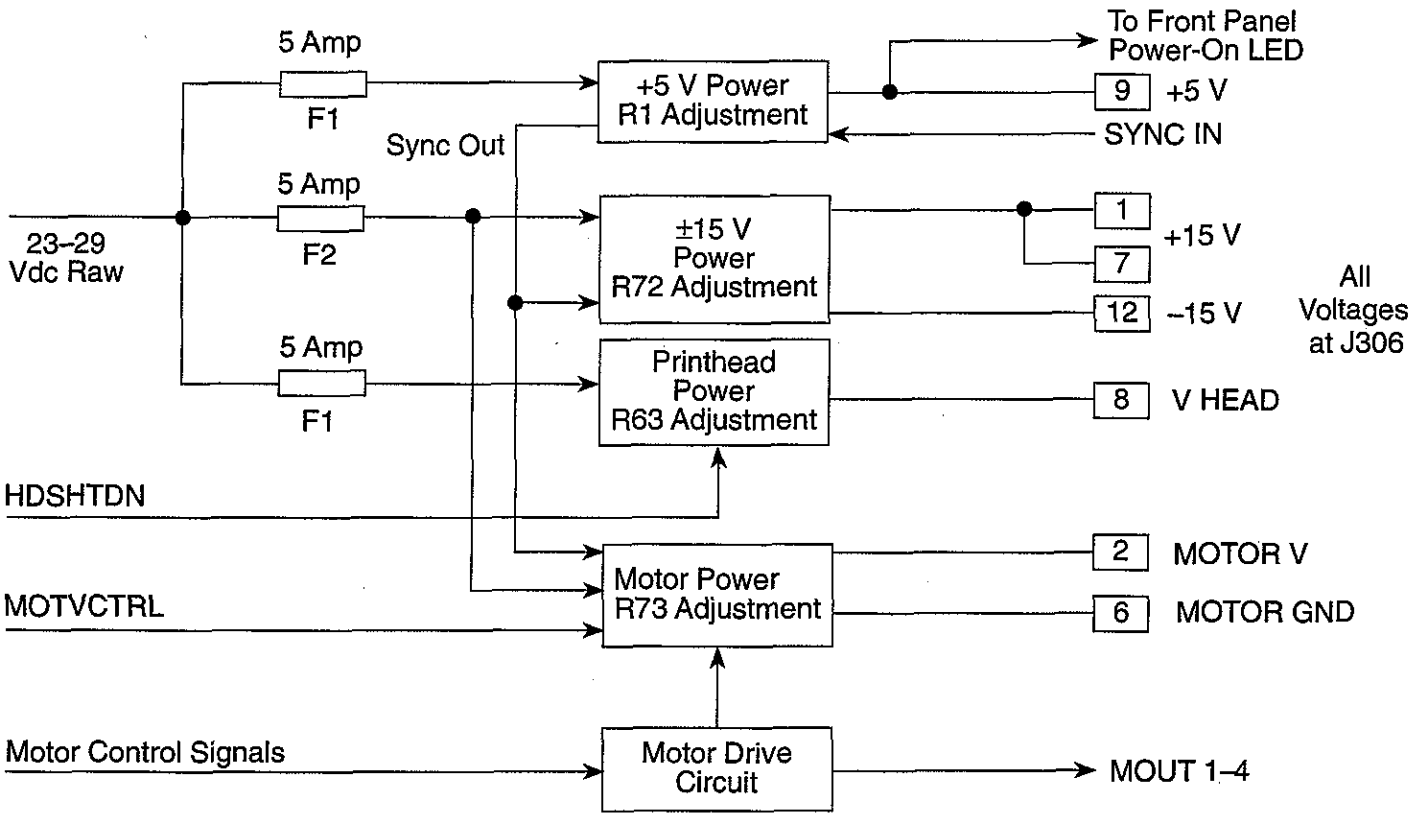
Inside the United States:
1-800-808-CORO (2676)

Outside the United States:
(203) 265-5631;
or contact your local distributor

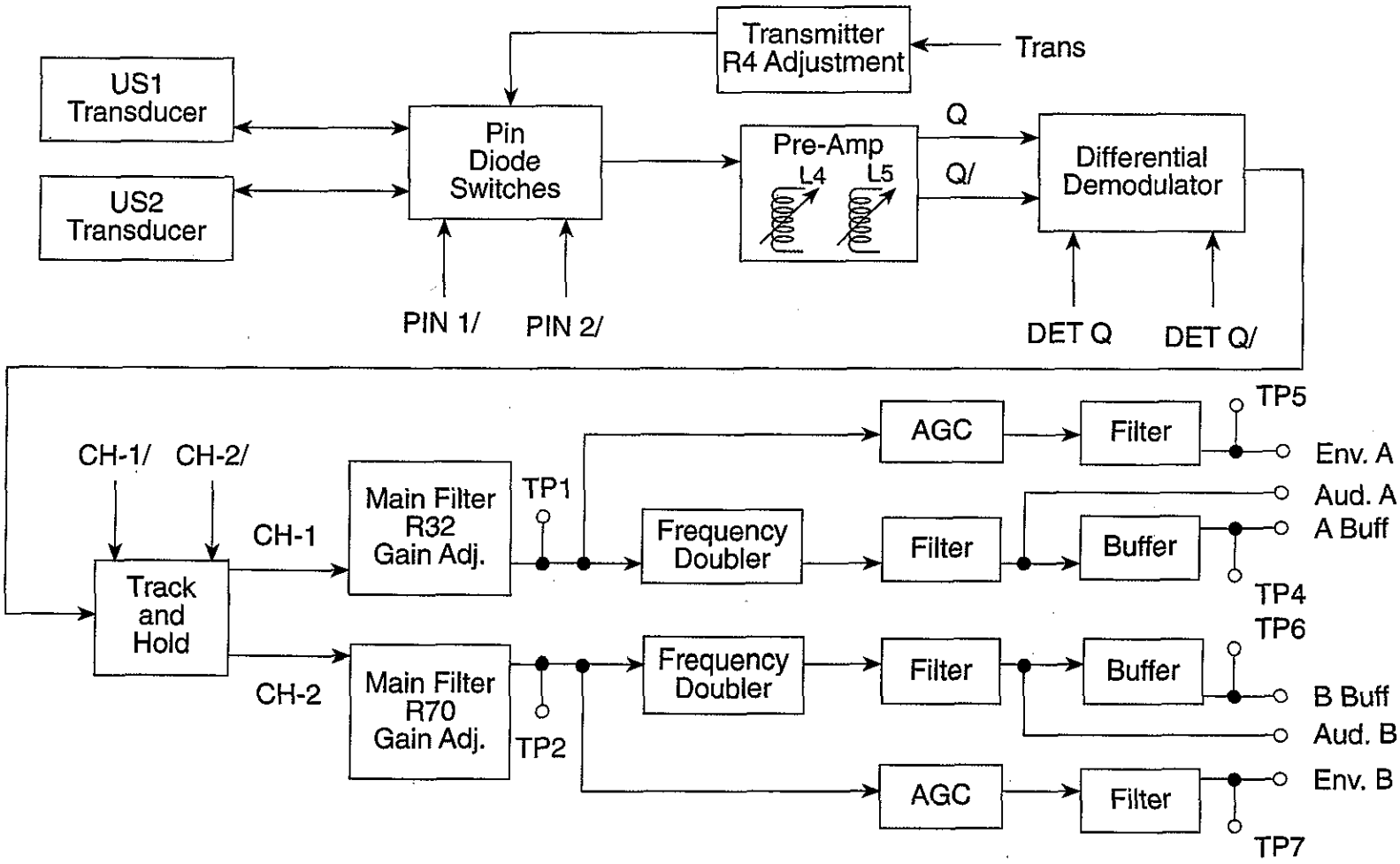


MODEL 118 MATERNAL / FETAL MONITOR BLOCK DIAGRAM

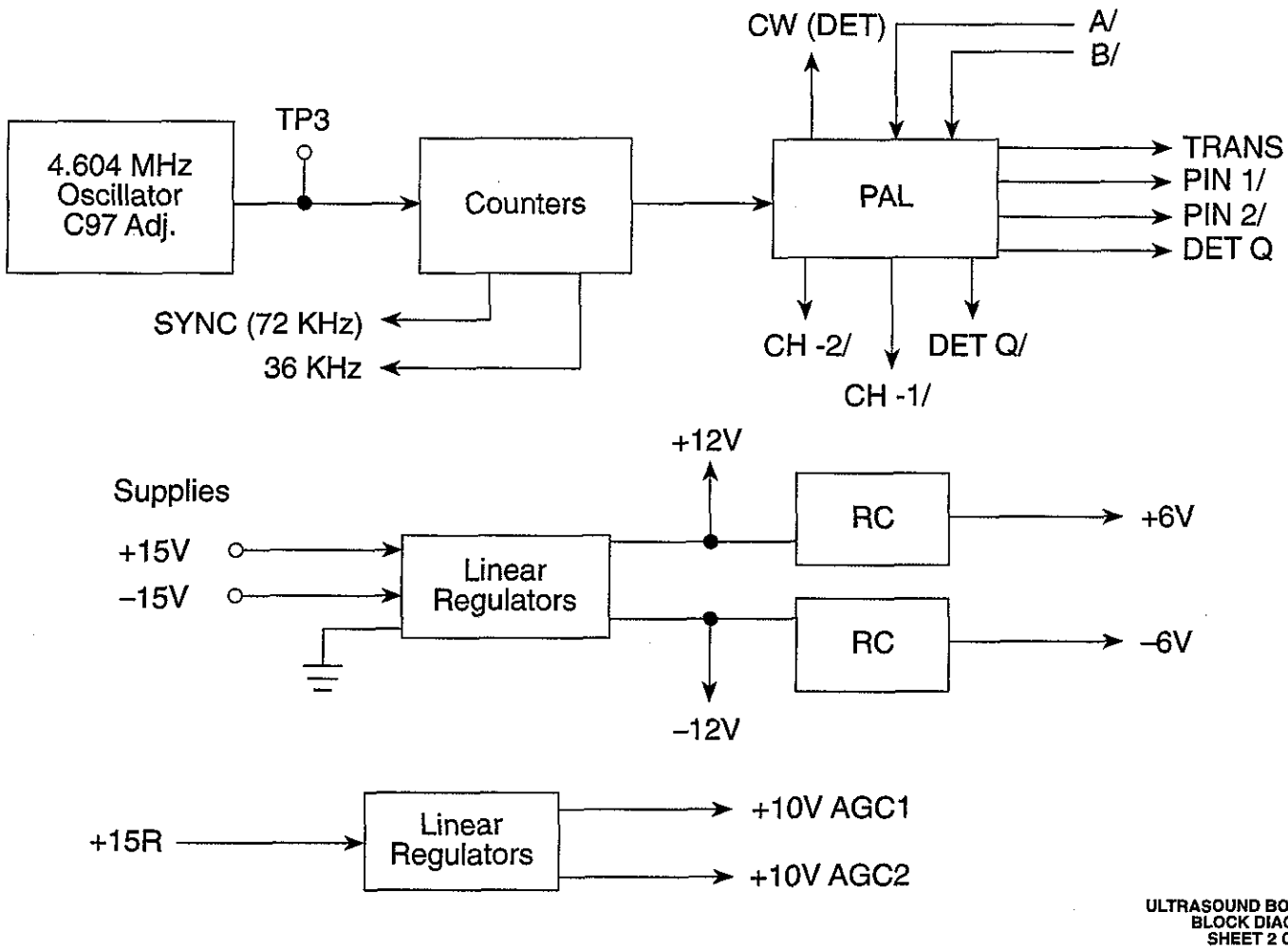
15-2



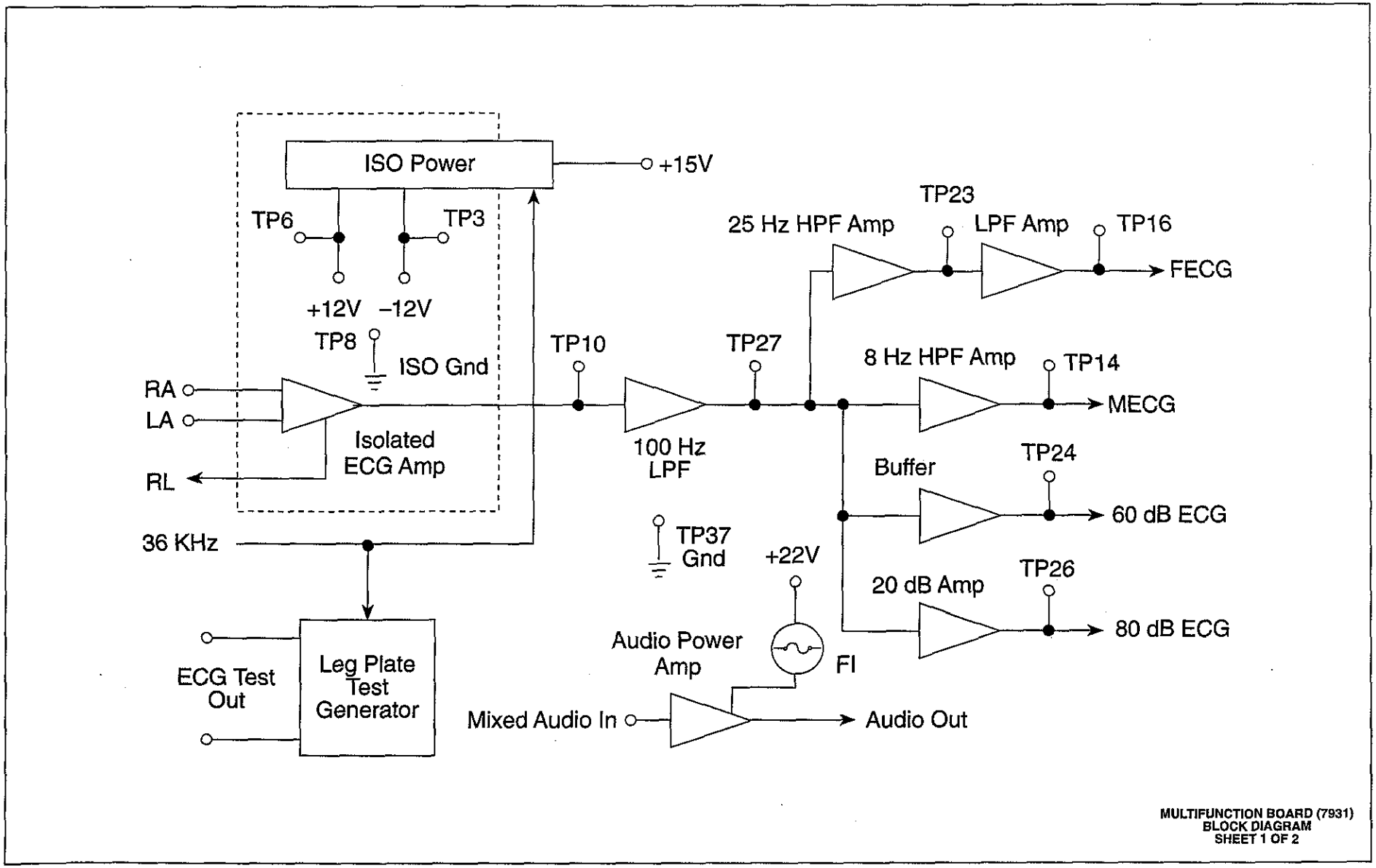
POWER SUPPLY BOARD (8370)
BLOCK DIAGRAM



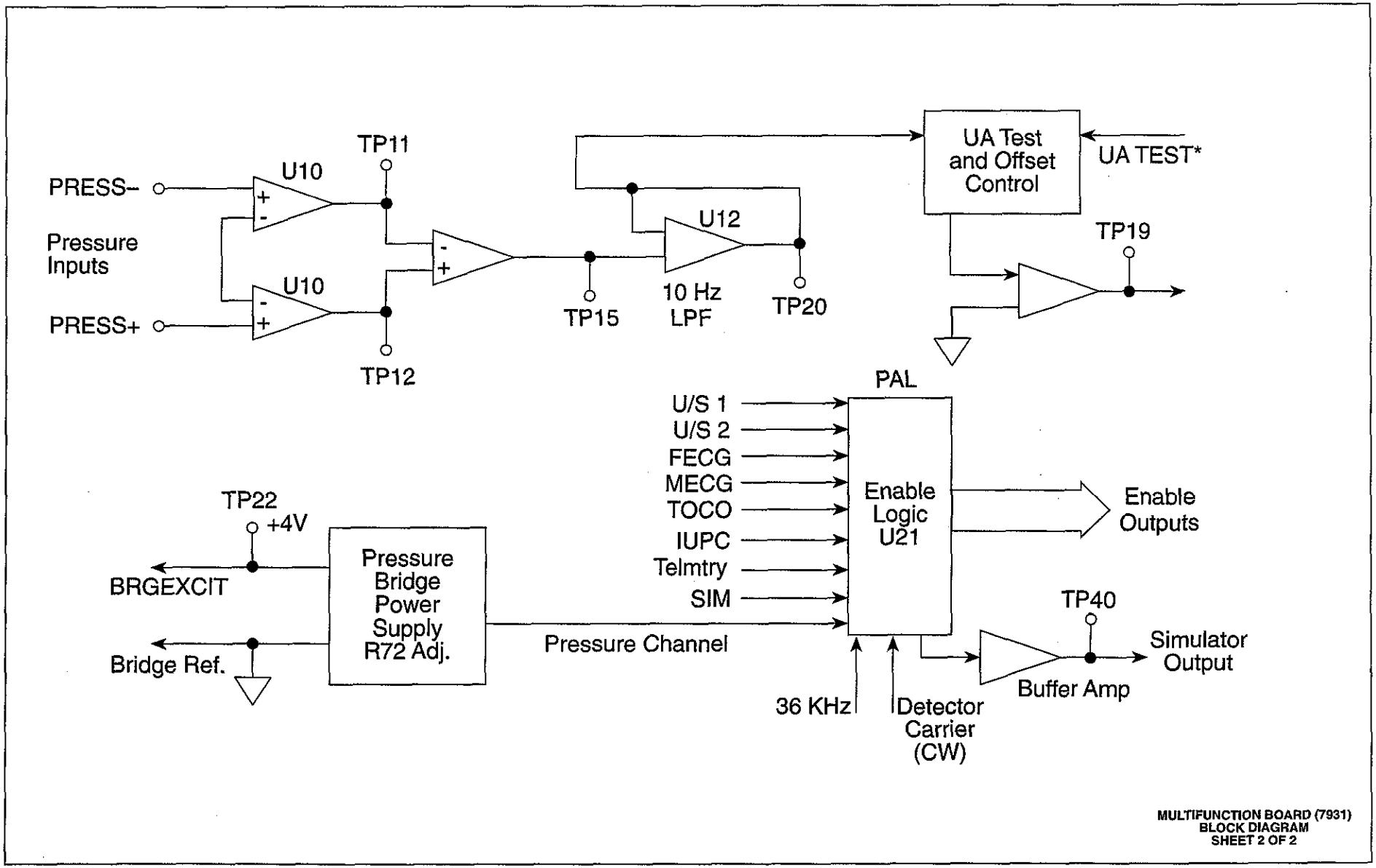
ULTRASOUND BOARD (9613)
BLOCK DIAGRAM
SHEET 1 OF 2



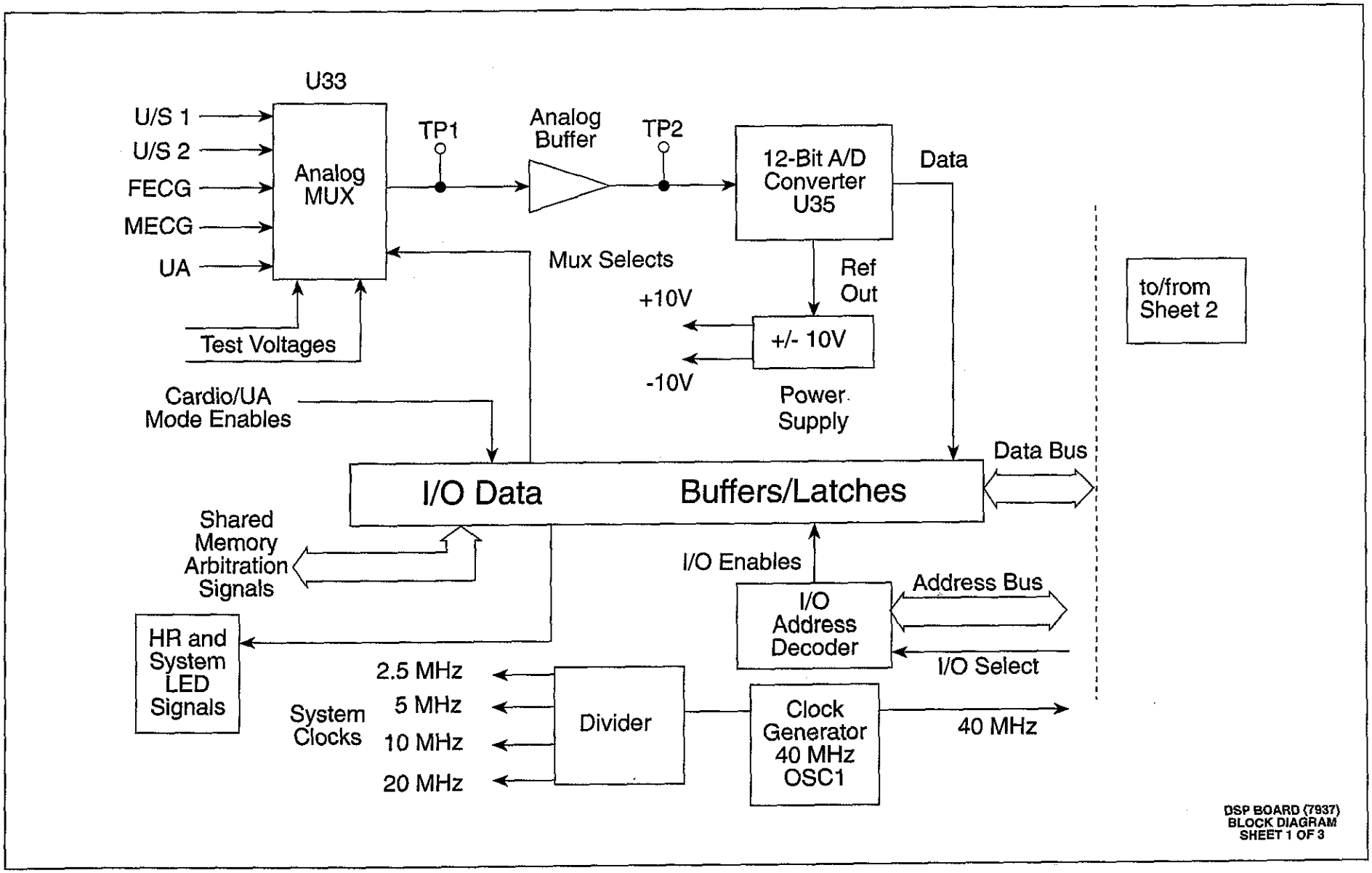
ULTRASOUND BOARD (9613)
BLOCK DIAGRAM
SHEET 2 OF 2

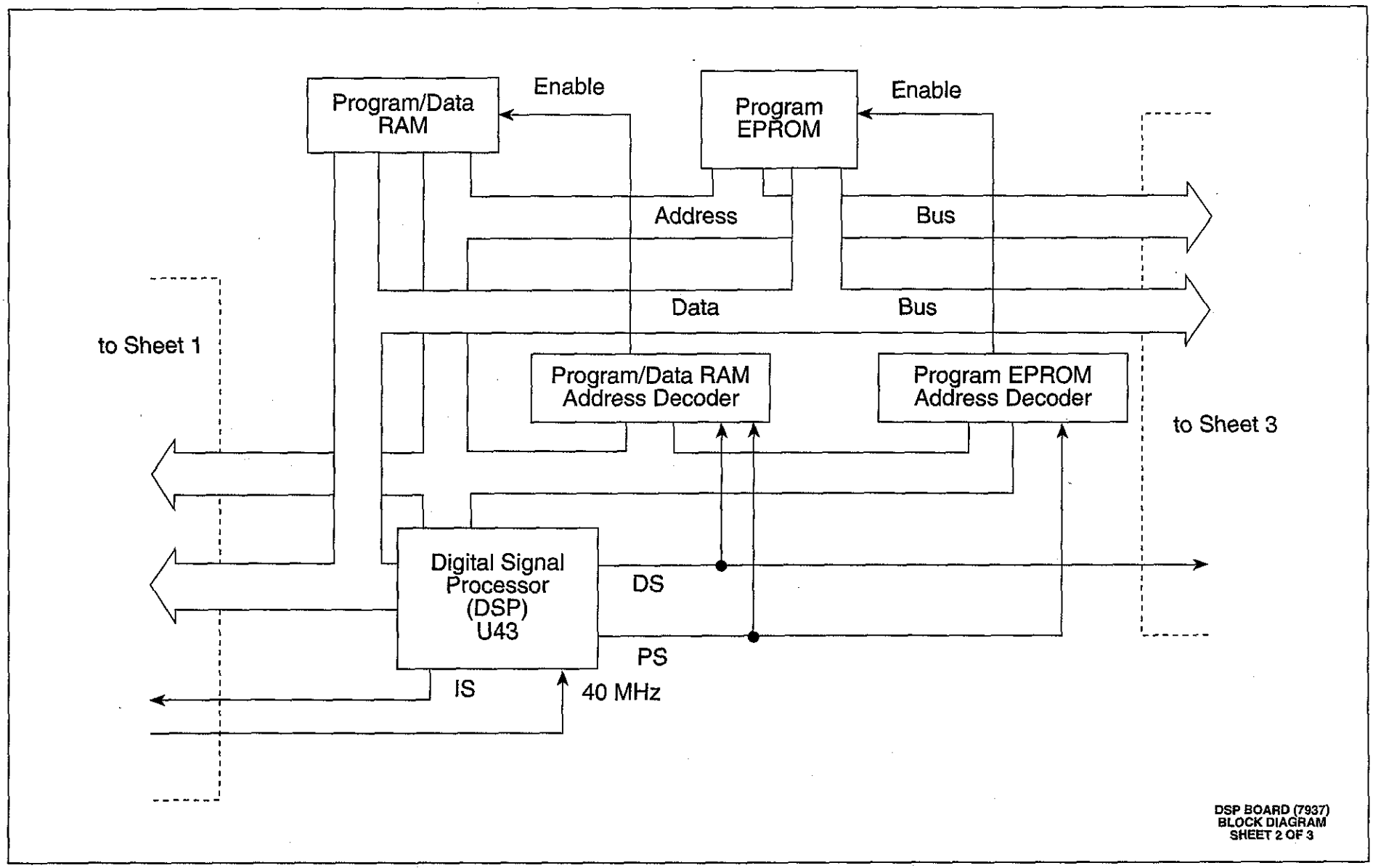


MULTIFUNCTION BOARD (7931)
BLOCK DIAGRAM
SHEET 1 OF 2

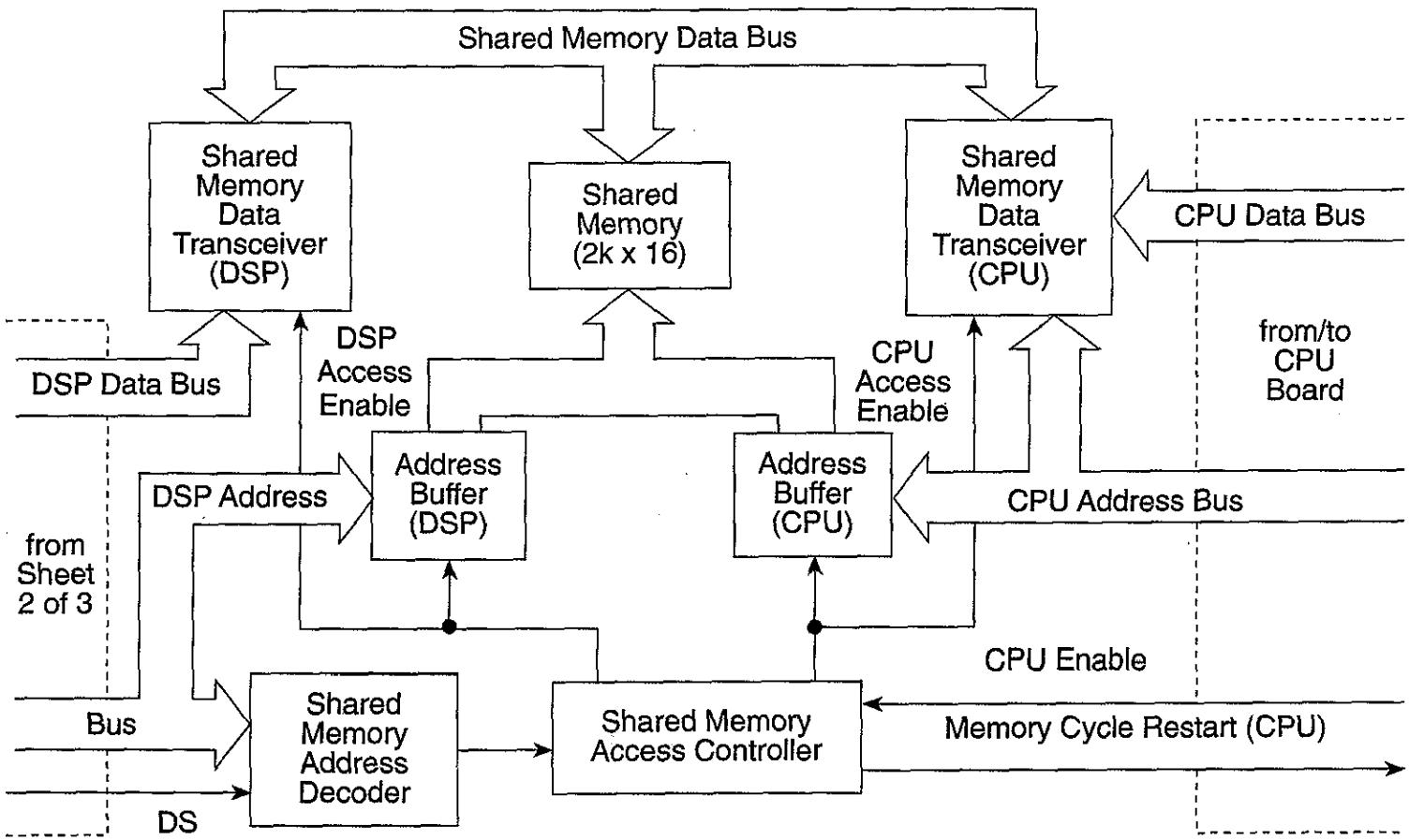


MULTIFUNCTION BOARD (7931)
BLOCK DIAGRAM
SHEET 2 OF 2

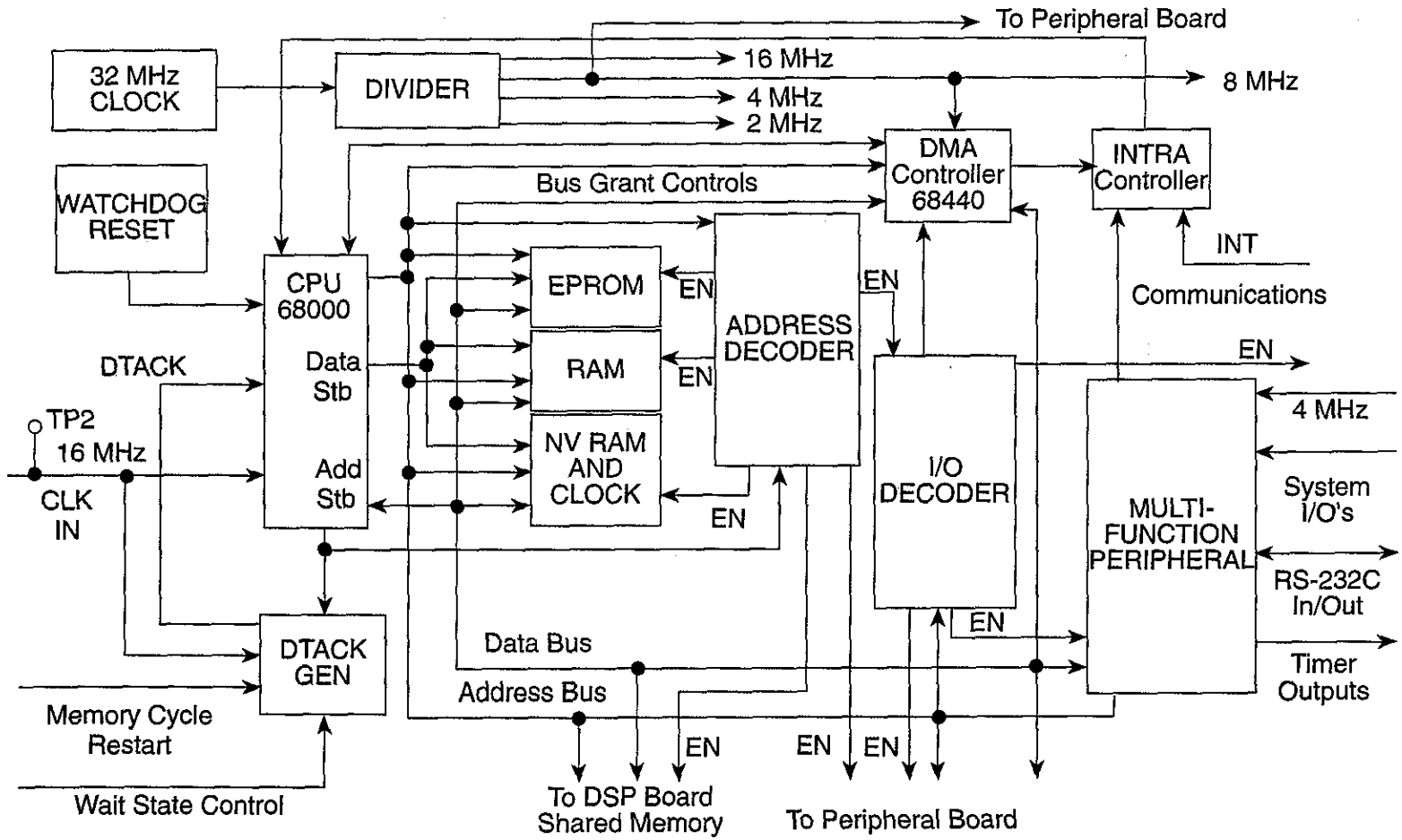

U33
U/S 1
U/S 2
FECG
MECG
UA
Analog MUX
TP1
Analog Buffer
TP2
12-Bit A/D Converter U35
Data
Mux Selects
Ref Out
+10V
+/- 10V
-10V
Power Supply
Test Voltages
to/from Sheet 2
Cardio/UA Mode Enables
Data Bus
I/O Data
Buffers/Latches
Shared Memory Arbitration Signals
I/O Enables
Address Bus
I/O Address Decoder
I/O Select
HR and System LED Signals
2.5 MHz
5 MHz
10 MHz
20 MHz
System Clocks
Divider
Clock Generator 40 MHz OSC1
40 MHz
DSP BOARD (7937)
BLOCK DIAGRAM
SHEET 1 OF 3



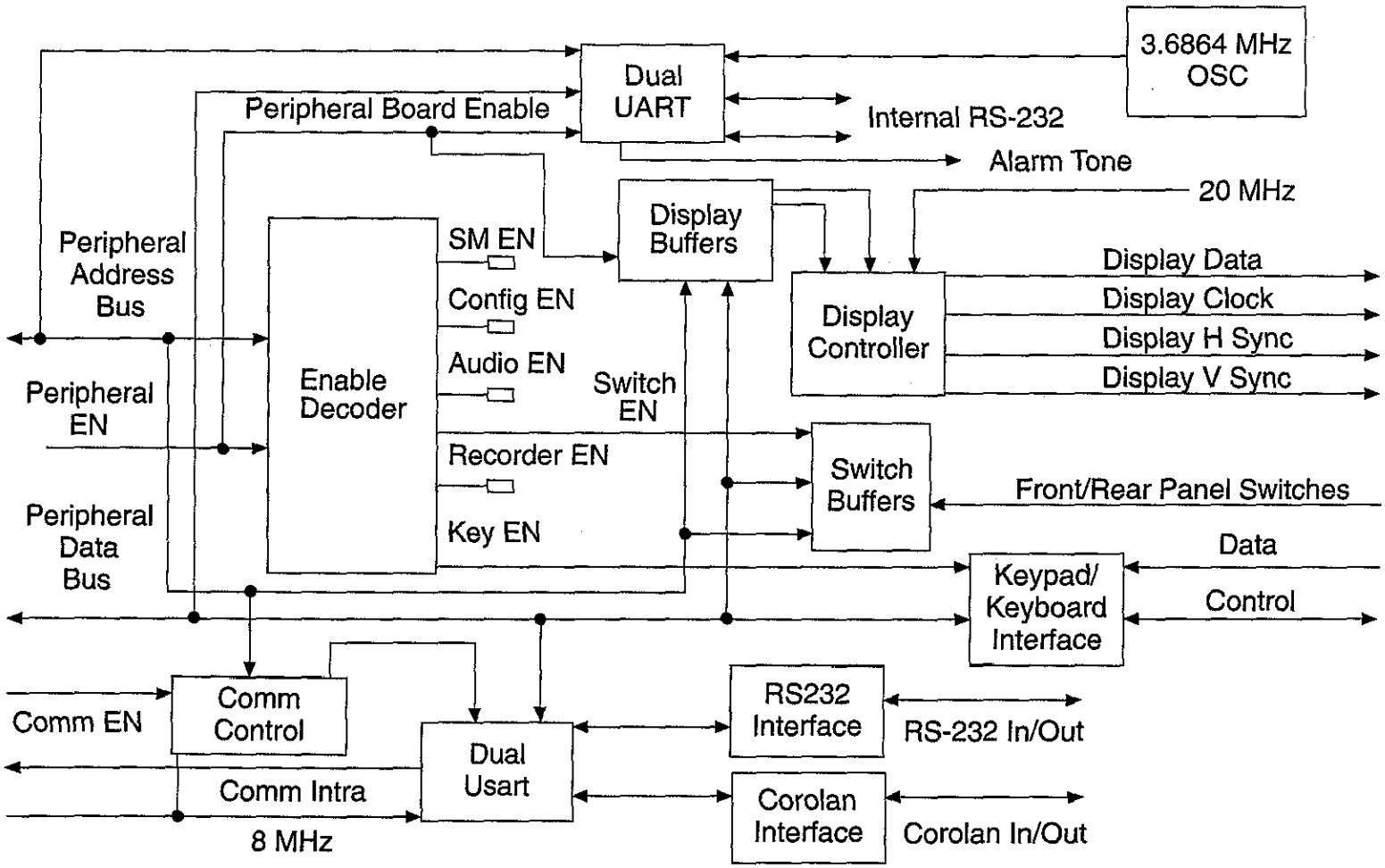
DSP BOARD (7937)
BLOCK DIAGRAM
SHEET 2 OF 3



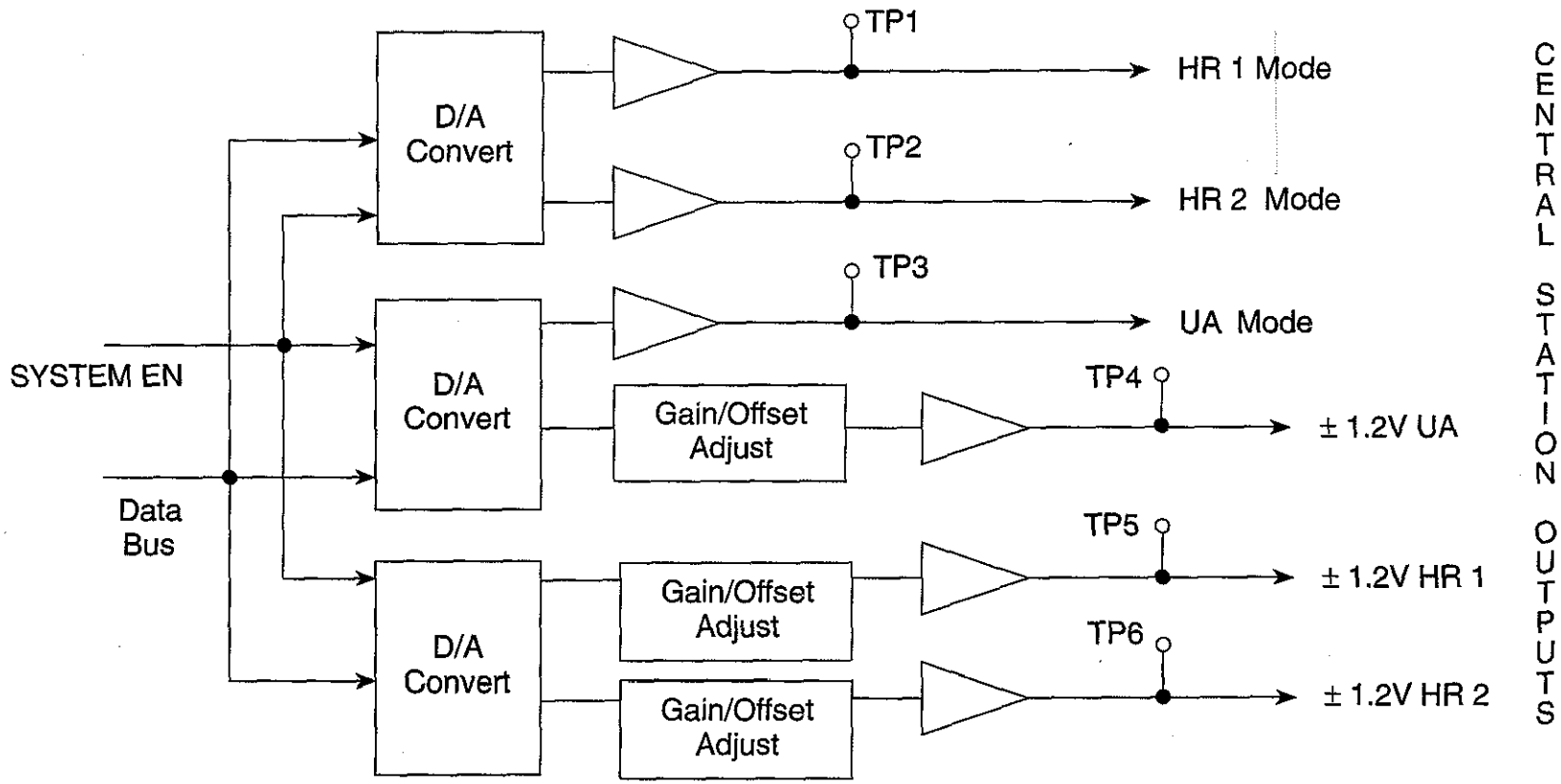
DSP BOARD (7937)
BLOCK DIAGRAM
SHEET 3 OF 3



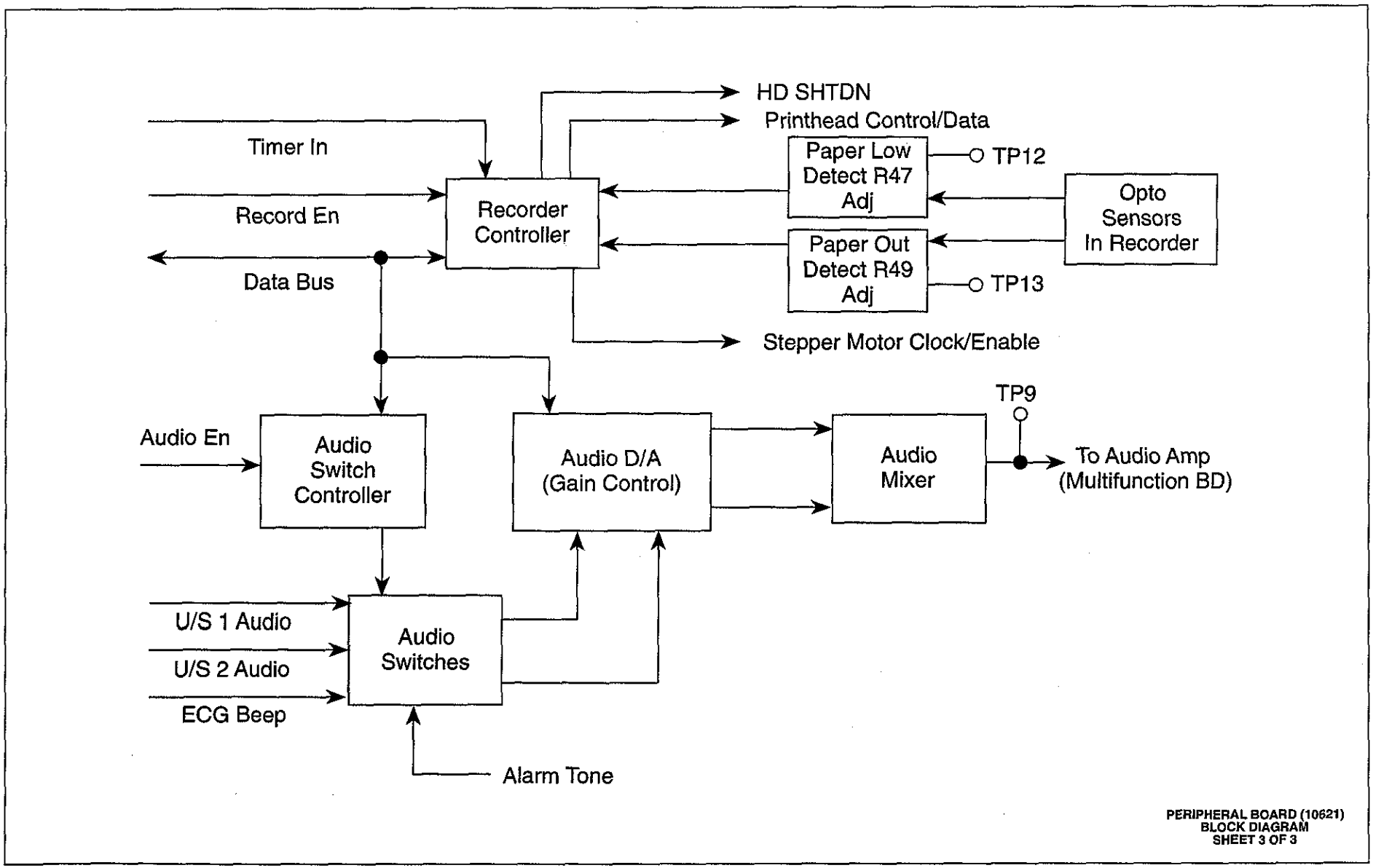
CPU BOARD (10622)
BLOCK DIAGRAM



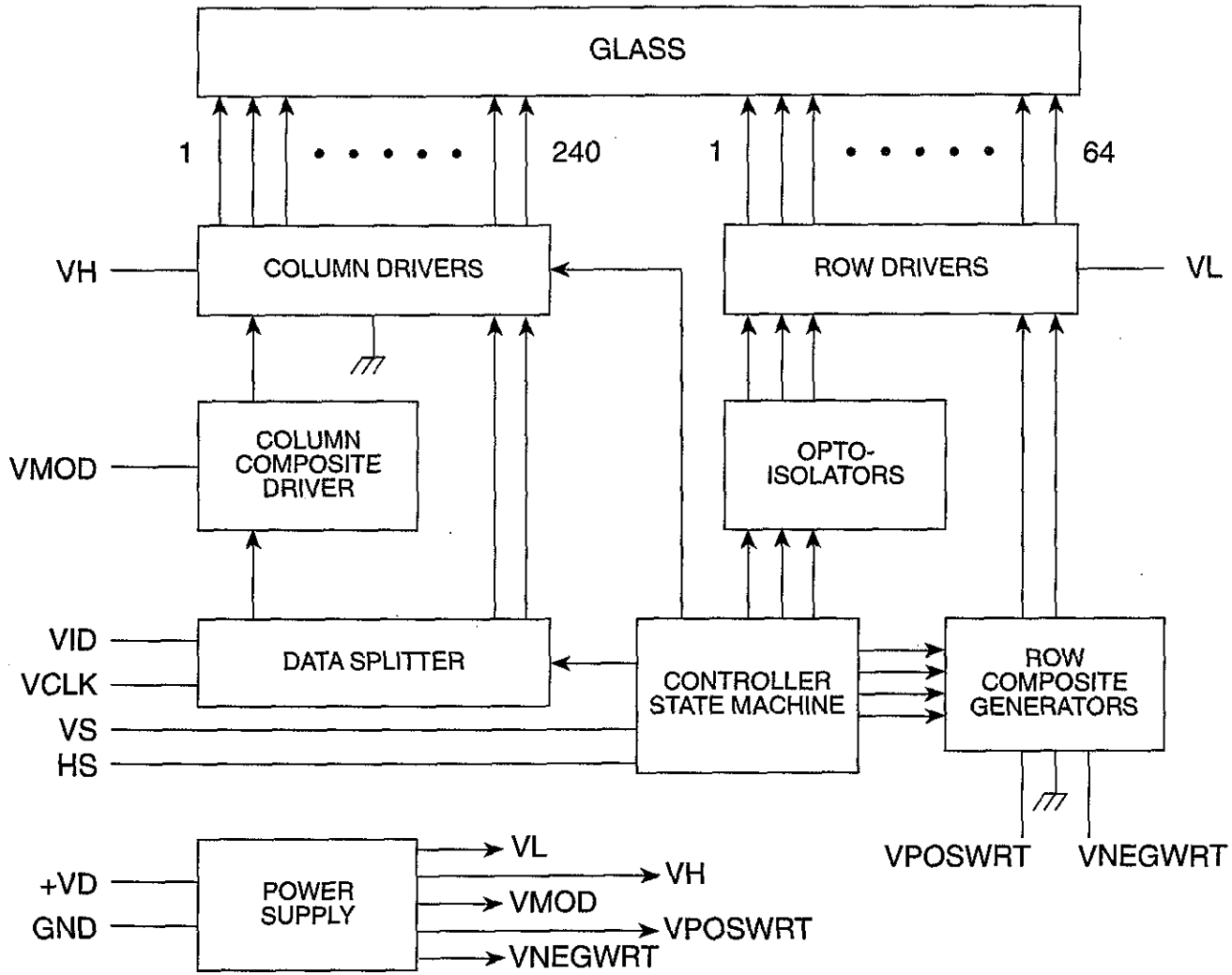
PERIPHERAL BOARD (10621)
BLOCK DIAGRAM
SHEET 1 OF 3



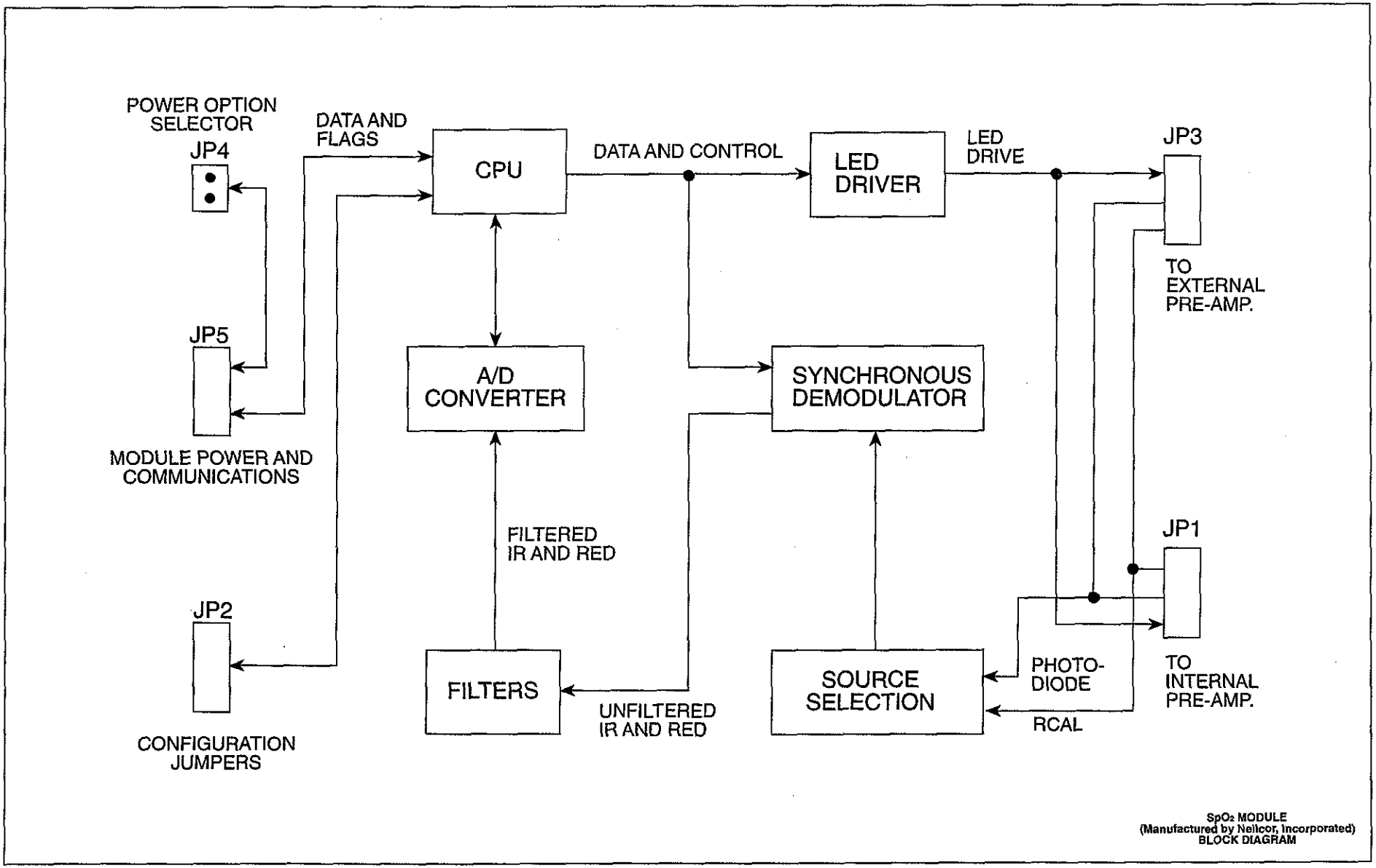
PERIPHERAL BOARD (10621)
BLOCK DIAGRAM
SHEET 2 OF 3



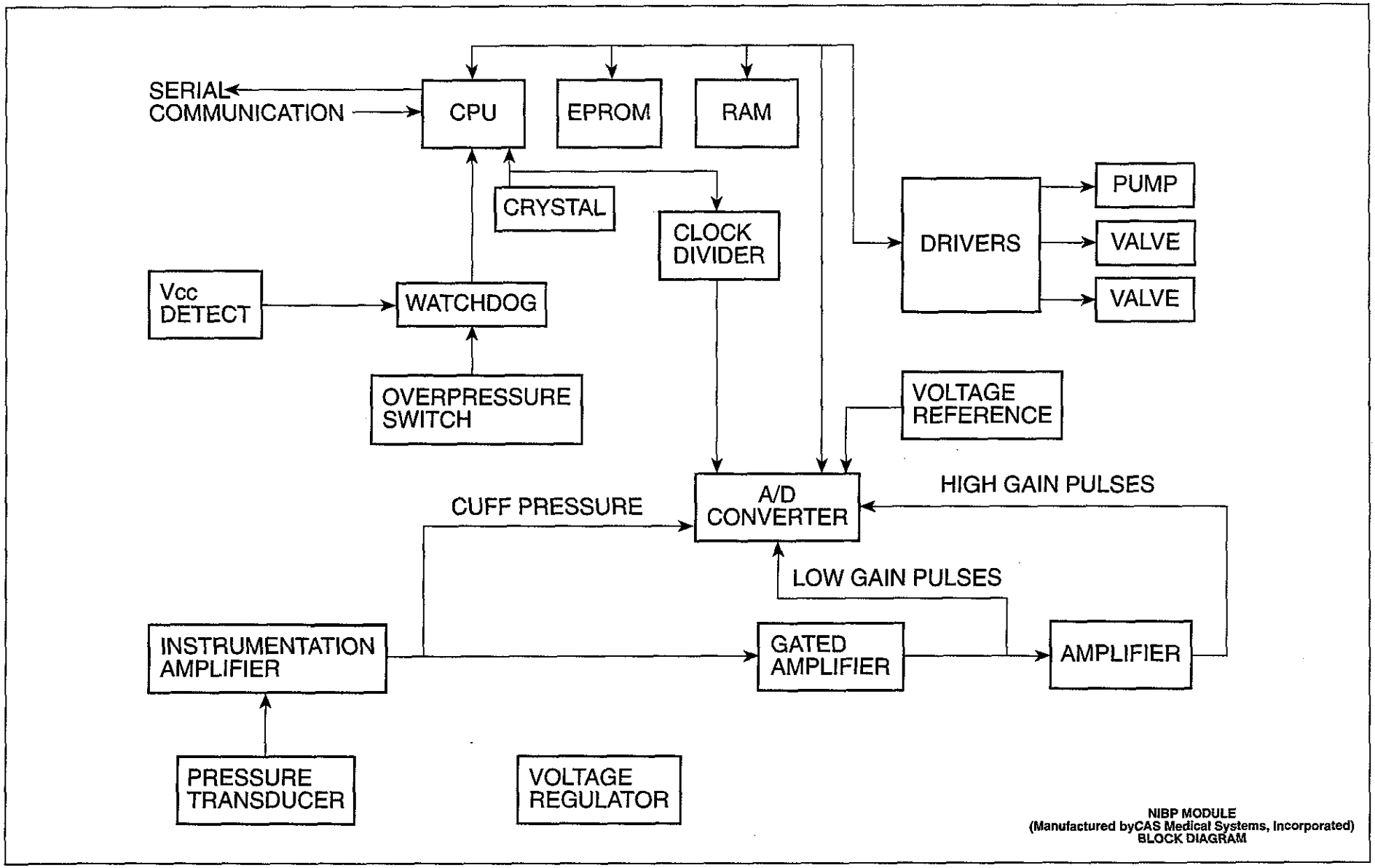
PERIPHERAL BOARD (10621)
BLOCK DIAGRAM
SHEET 3 OF 3



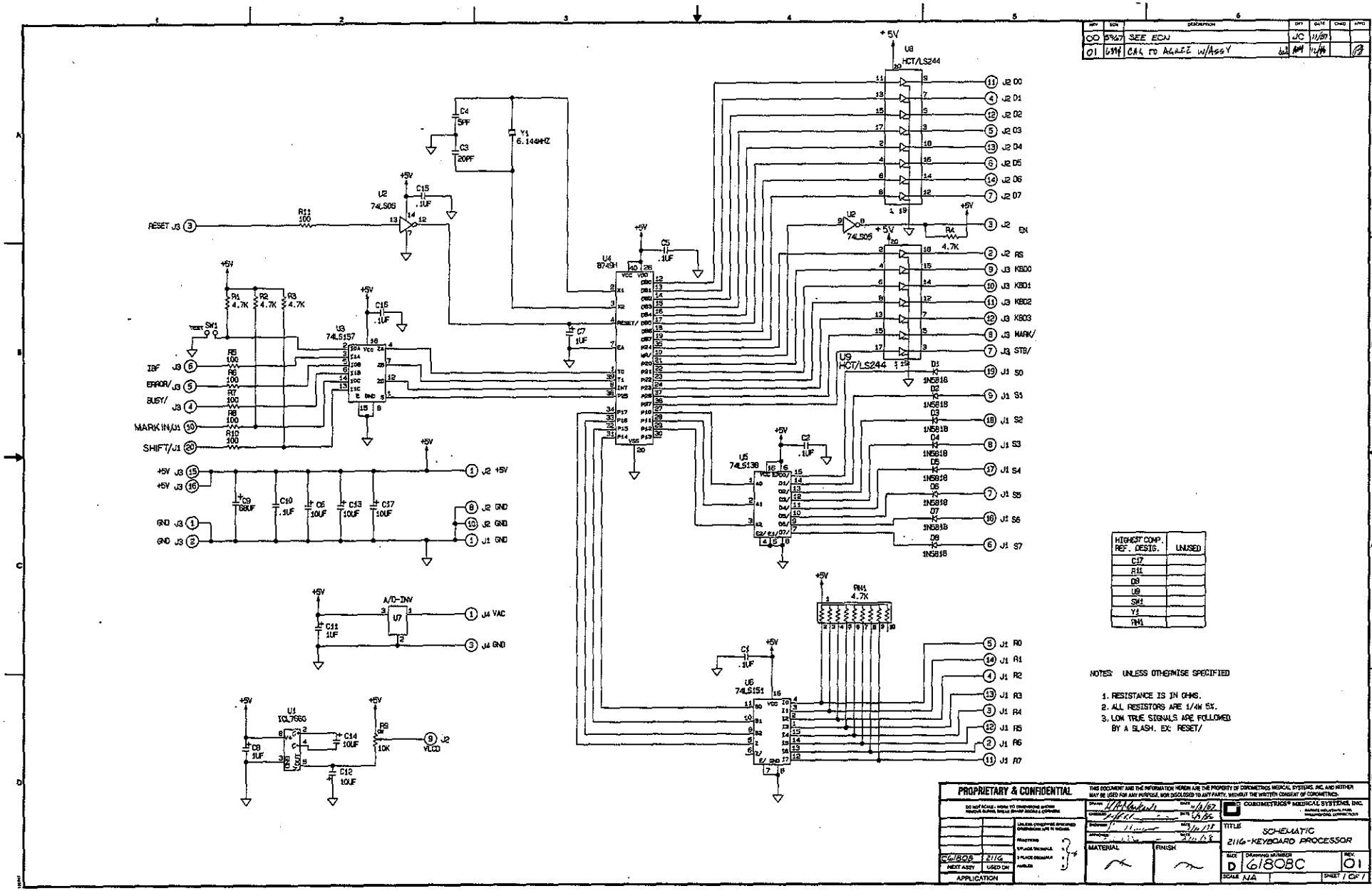
ELECTROLUMINESCENT DISPLAY
(Manufactured by Planar Systems, Inc.)
BLOCK DIAGRAM



SpO_2 MODULE
(Manufactured by Nellcor, Incorporated)
BLOCK DIAGRAM



NIBP MODULE
(Manufactured byCAS Medical Systems, Incorporated)
BLOCK DIAGRAM


REV | ECN | DESCRIPTION | DFT | DATE | CHKD | APVD
00 | 5947 | SEE ECN | JC | 11/87
01 | 6514 | CAL TO AGREE W/ASSY | MM | 11/96
U8 HCT/LS244
U9 HCT/LS244
U2 74LS05
U3 74LS157
U4 8749H
U5 74LS138
U6 74LS151
U7 A/D-INV
U1 ICL7660
Y1 6.144MHZ
RESET J3
IBF J3
ERROR/ J3
BUSY/ J3
MARK IN/J1
SHIFT/J1
J2 D0
J2 D1
J2 D2
J2 D3
J2 D4
J2 D5
J2 D6
J2 D7
J2 EX
J2 RS
J3 KB00
J3 KB01
J3 KB02
J3 KB03
J3 MARK/
J3 STB/
J1 S0
J1 S1
J1 S2
J1 S3
J1 S4
J1 S5
J1 S6
J1 S7
J2 +5V
J2 GND
J4 VAC
J4 GND
J1 R0
J1 R1
J1 R2
J1 R3
J1 R4
J1 R5
J1 R6
J1 R7
VLCD
HIGHEST COMP. REF. DESIG. | UNUSED
C17
R11
D9
U9
SW1
Y1
RN1
NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTANCE IS IN OHMS.
2. ALL RESISTORS ARE 1/4W 5%.
3. LOW TRUE SIGNALS ARE FOLLOWED BY A SLASH. EX: RESET/
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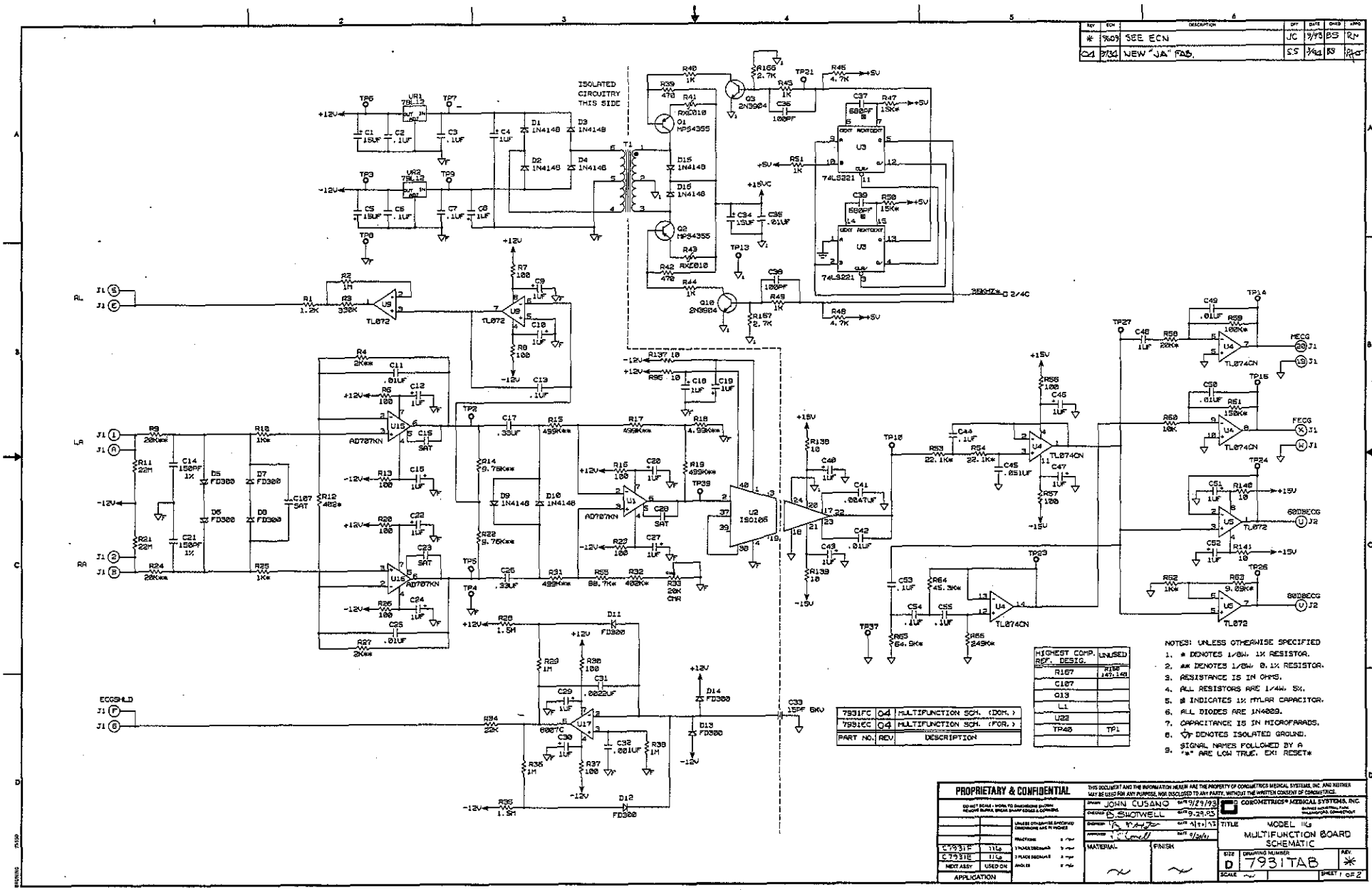
COROMETRICS® MEDICAL SYSTEMS, INC.
TITLE SCHEMATIC 2116-KEYBOARD PROCESSOR
MATERIAL
FINISH
SIZE D
DRAWING NUMBER 6808C
REV. 01
SCALE N/A
SHEET 1 OF 1
C6808 | 2116 | NEXT ASSY | USED ON | APPLICATION


ISOLATED CIRCUITRY THIS SIDE
TL072
AD707KN
IS0105
TL074CN
74LS221
6007C
FD300
1N4148
MPS4355
2N3904
RXE010
ECGSHLD
RL
LA
RA
REV | ECN | DESCRIPTION | DFT | DATE | CHKD | APPD
* | 9609 | SEE ECN | JC | 9/93 | BS | RN
01 | 9730 | NEW "JA" PAB. | SS | 3/94 | BS | RN
7931FC | 04 | MULTIFUNCTION SCH. (DOM.)
7931EC | 04 | MULTIFUNCTION SCH. (FOR.)
PART NO. | REV | DESCRIPTION
HIGHEST COMP. REF. DESIG. | UNUSED
R167 | R158 147,148
C127
Q13
L1
U22
TP48 | TP1
NOTES: UNLESS OTHERWISE SPECIFIED
1. * DENOTES 1/8W, 1% RESISTOR.
2. ** DENOTES 1/8W, 0.1% RESISTOR.
3. RESISTANCE IS IN OHMS.
4. ALL RESISTORS ARE 1/4W, 5%.
5. # INDICATES 1% MYLAR CAPACITOR.
6. ALL DIODES ARE 1N4009.
7. CAPACITANCE IS IN MICROFARADS.
8. ⏚ DENOTES ISOLATED GROUND.
9. SIGNAL NAMES FOLLOWED BY A "*" ARE LOW TRUE. EX: RESET*
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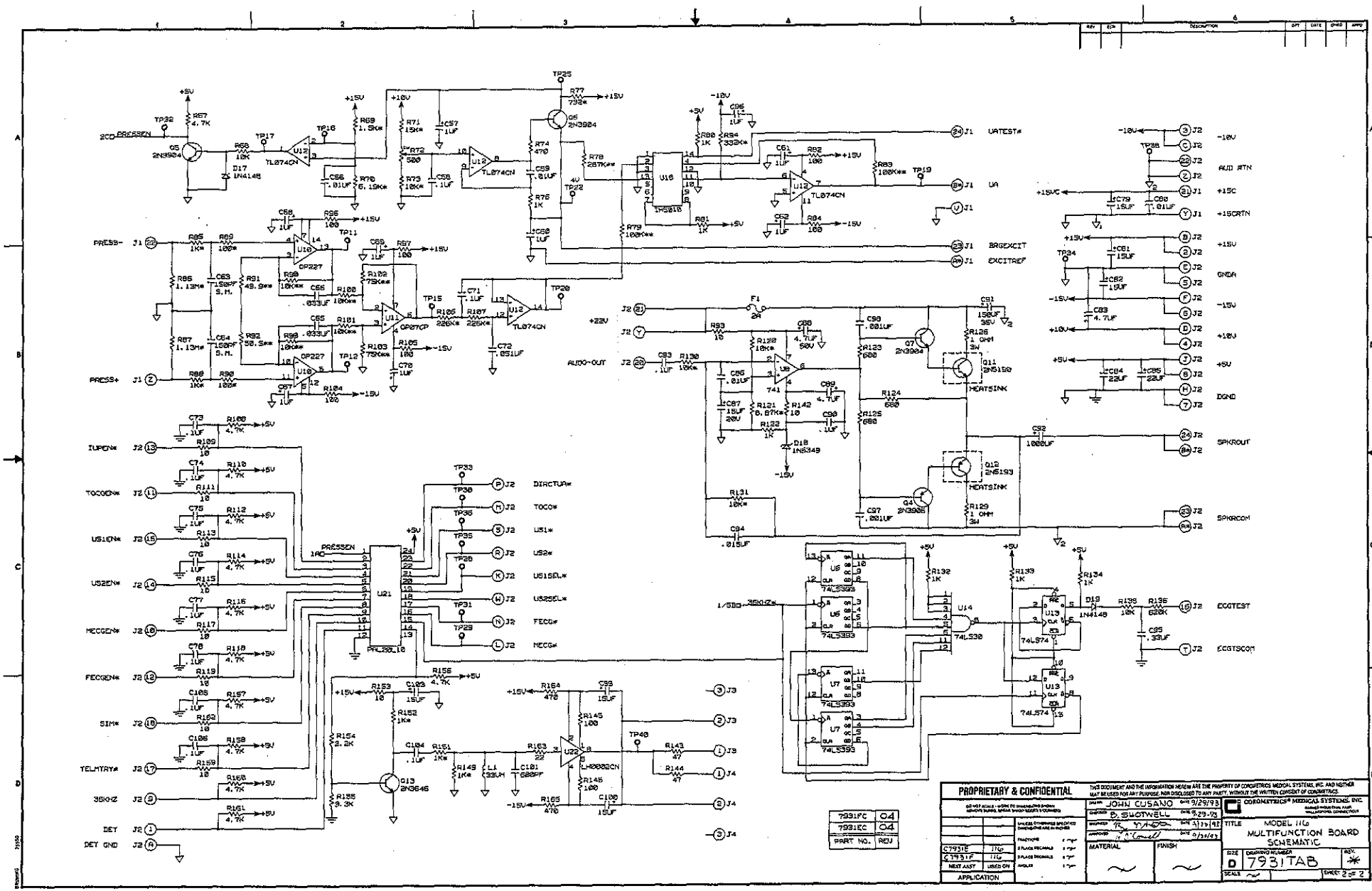
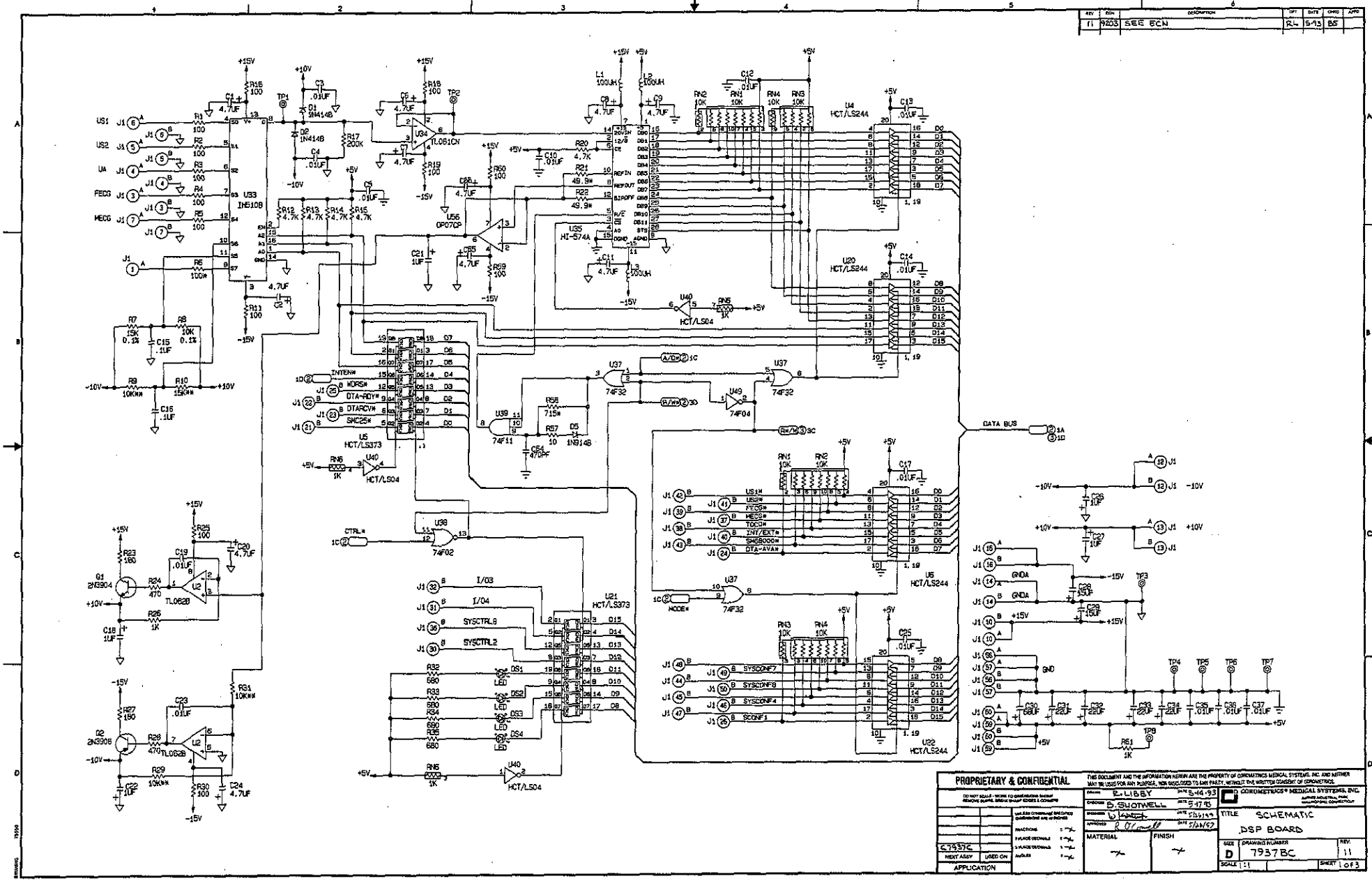
DRAWN JOHN CUSANO 9/29/93
CHECKED B.SWOTWELL 9.29.93
COROMETRICS® MEDICAL SYSTEMS, INC.
TITLE MODEL 116 MULTIFUNCTION BOARD SCHEMATIC
DRAWING NUMBER D 7931TAB REV *
SHEET 1 OF 2
MATERIAL
FINISH
C7931F 116
C7931E 116
NEXT ASSY USED ON
APPLICATION


PROPRIETARY & CONFIDENTIAL
CORometrics® MEDICAL SYSTEMS, INC.
MODEL 116
MULTIFUNCTION BOARD SCHEMATIC
7931TAB
SHEET 2 OF 2
7931FC 04
7931EC 04
PART NO. REV


REV | ECN | DESCRIPTION | DFT | DATE | CHKD | APPD
11 | 9203 | SEE ECN | RL | 5-93 | BS
DATA BUS
PROPRIETARY & CONFIDENTIAL
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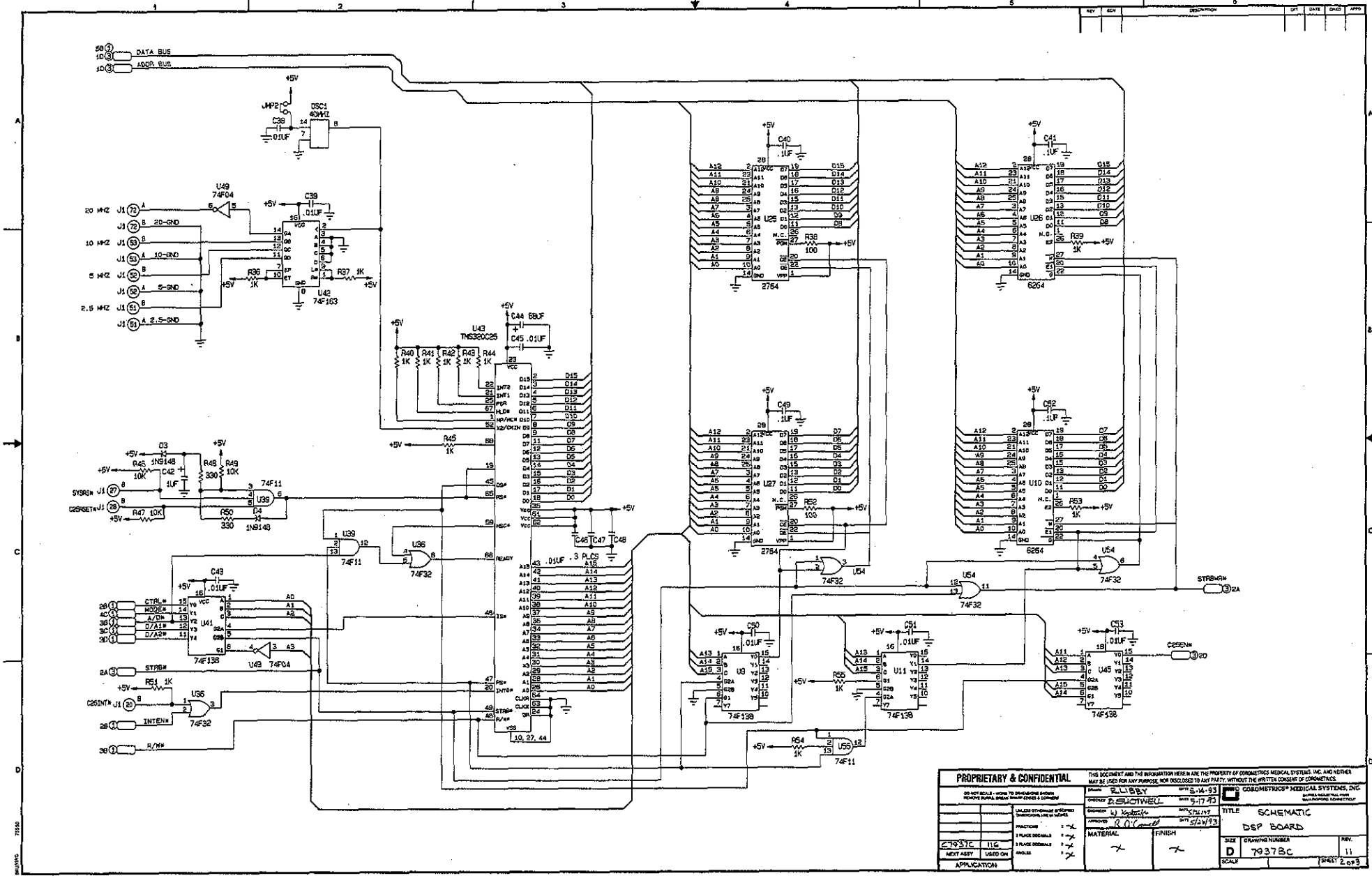
DRAWN E.LIBBY 5-14-93
CHECKED E.SHOTWELL 5-17-93
ENGINEER L.HANEY 5/21/93
APPROVED R.ORMEROD 5/24/93
COROMETRICS® MEDICAL SYSTEMS, INC.
TITLE SCHEMATIC DSP BOARD
MATERIAL
FINISH
SIZE D
DRAWING NUMBER 7937BC
REV. 11
SCALE 1:1
SHEET 1 OF 3
7937C
NEXT ASSY
USED ON
APPLICATION



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DO NOT SCALE - WORK TO DIMENSIONS SHOWN
REMOVE BURRS, BREAK SHARP EDGES & CORNERS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
ANGLES ±

79378C | 116
NEXT ASSY | USED ON
APPLICATION

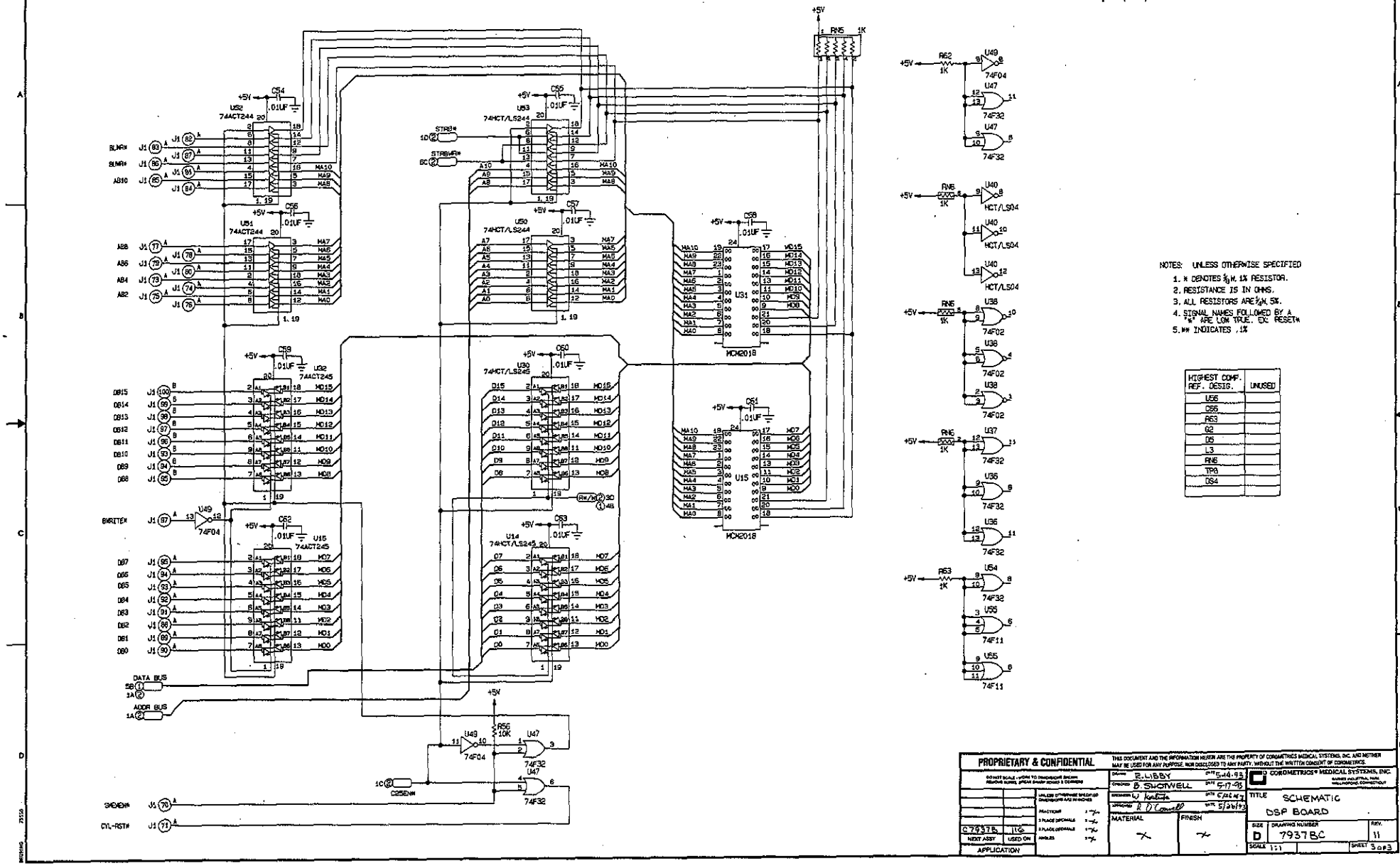
Drawn	R.LIBBY	DATE 5-14-93
CHECKED	D.SHOTWELL	DATE 5-17-93
ENGINEER	W. Kobielski	DATE 5/24/93
APPROVED	R. O'Connell	DATE 5/24/93
MANUFACTURING		
MATERIAL		FINISH

COROMETRICS® MEDICAL SYSTEMS, INC.
WALLINGFORD, CONNECTICUT

TITLE: SCHEMATIC
DSP BOARD

SIZE: D | DRAWING NUMBER: 79378C | REV: 11
SCALE | SHEET 2 of 3

15-22


NOTES: UNLESS OTHERWISE SPECIFIED
1. * DENOTES 1/8W, 1% RESISTOR.
2. RESISTANCE IS IN OHMS.
3. ALL RESISTORS ARE 1/4W, 5%.
4. SIGNAL NAMES FOLLOWED BY A '*' ARE LOW TRUE. EX: RESET*
5. ** INDICATES .1%
HIGHEST COMP. REF. DESIG.
UNUSED
U55
D56
R63
G2
D5
L3
RN6
TP8
DS4
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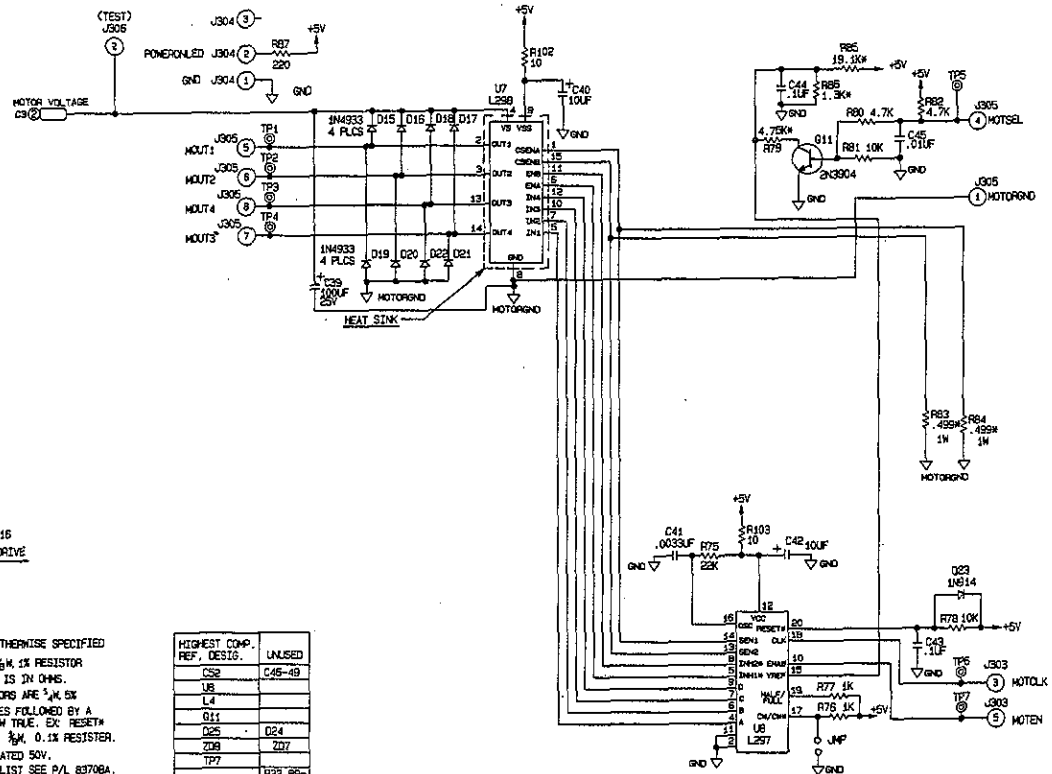
DRAWN R.LIBBY 5-14-93
CHECKED B.SNOTWELL 5-17-93
ENGINEER W. Kontula 5/24/93
APPROVED R.D.Cowell 5/26/93
COROMETRICS MEDICAL SYSTEMS, INC.
TITLE SCHEMATIC DSP BOARD
SIZE D
DRAWING NUMBER 7937BC
REV. 11
SCALE 1:1
SHEET 3 of 3
MATERIAL X
FINISH X
7937B
NEXT ASSY
USED ON
APPLICATION

REV	ECN	DESCRIPTION	DRT	DATE	CHKD	APPD
02	8021	CHG TO AGREE	MM	6-91	BS	
03	9387	CHG TO AGREE	RL	9-93	BS	



SCHEMATIC MODEL 116
POWER SUPPLY MOTOR DRIVE

NOTES: UNLESS OTHERWISE SPECIFIED

1. * DENOTES 1/8W, 1% RESISTOR
2. RESISTANCE IS IN OHMS.
3. ALL RESISTORS ARE 1/4W, 5%
4. SIGNAL NAMES FOLLOWED BY A "*" ARE LOW TRUE. EX: RESET*
5. ** DENOTES 1/8W, 0.1% RESISTER.
6. CAPS ARE RATED 50V.
7. FOR PARTS LIST SEE P/L 83708A.

HIGHEST COMP. REF. DESIG.	UNUSED
C52	C45-49
U8	
L4	
Q11	
D25	D24
ZD8	ZD7
TP7	
R114	R22, 89-101, 104-109

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REMOVE BURRS, BREAK SHARP EDGES & CORNERS
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
ANGLES ±

DRAWN	DATE
R.LIBBY	9.1.93
CHECKED D. SHOTWELL	9.3.93
ENGINEER R.JO	7/1/91
APPROVED R.JO	7/1/91

COROMETRICS® MEDICAL SYSTEMS, INC.
Bullard Industrial Park
Wallingford, Connecticut

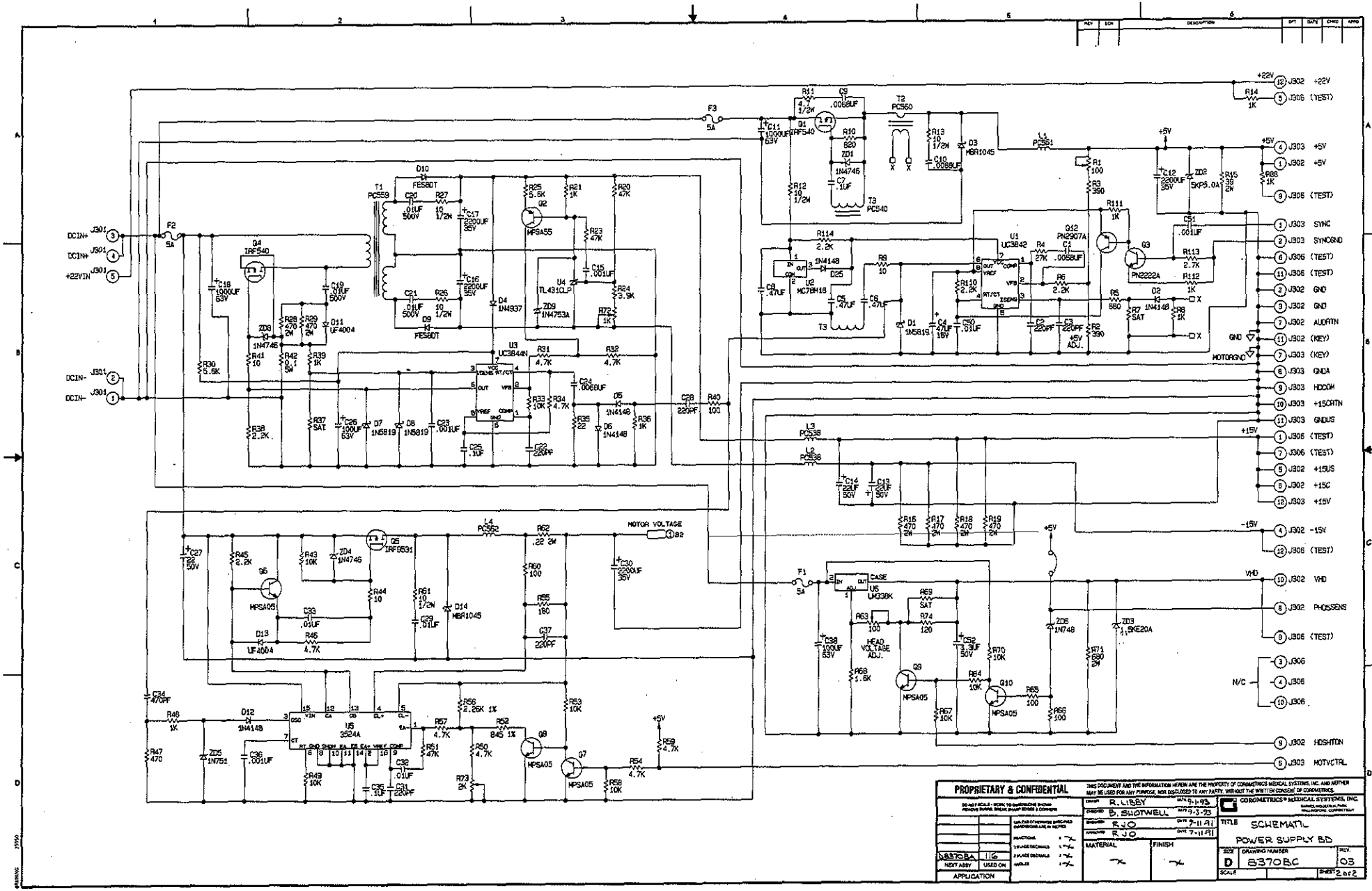
TITLE SCHEMATIC
POWER SUPPLY BD

83708A	116
NEXT ASSY	USED ON
APPLICATION	

MATERIAL — FINISH —

SIZE	DRAWING NUMBER	REV.
D	8370BC	03
SCALE		SHEET 1 of 2

1.24


DCIN+
DCIN+
+22VIN
DCIN-
DCIN-
F2
5A
F3
5A
F1
5A
T1 PC559
T2 PC560
T3 PC540
L1 PC561
L2 PC538
L3 PC538
L4 PC562
Q1 IRF540
Q4 IRF540
Q5 IRF9631
U1 UC3842
U2 MC78M18
U3 UC3844N
U4 TL431CLP
U5 UC3824A
U6 UC336K
HEAD VOLTAGE ADJ.
MOTOR VOLTAGE
MOTORGND
GND
N/C
+22V
+15V
+5V
-15V
VHD
SYNC
SYNCGND
AUDATN
HDCOM
+15CATN
GNDUS
+15US
+15C
PHOSSENS
HDSHTCN
MOTVCTRL
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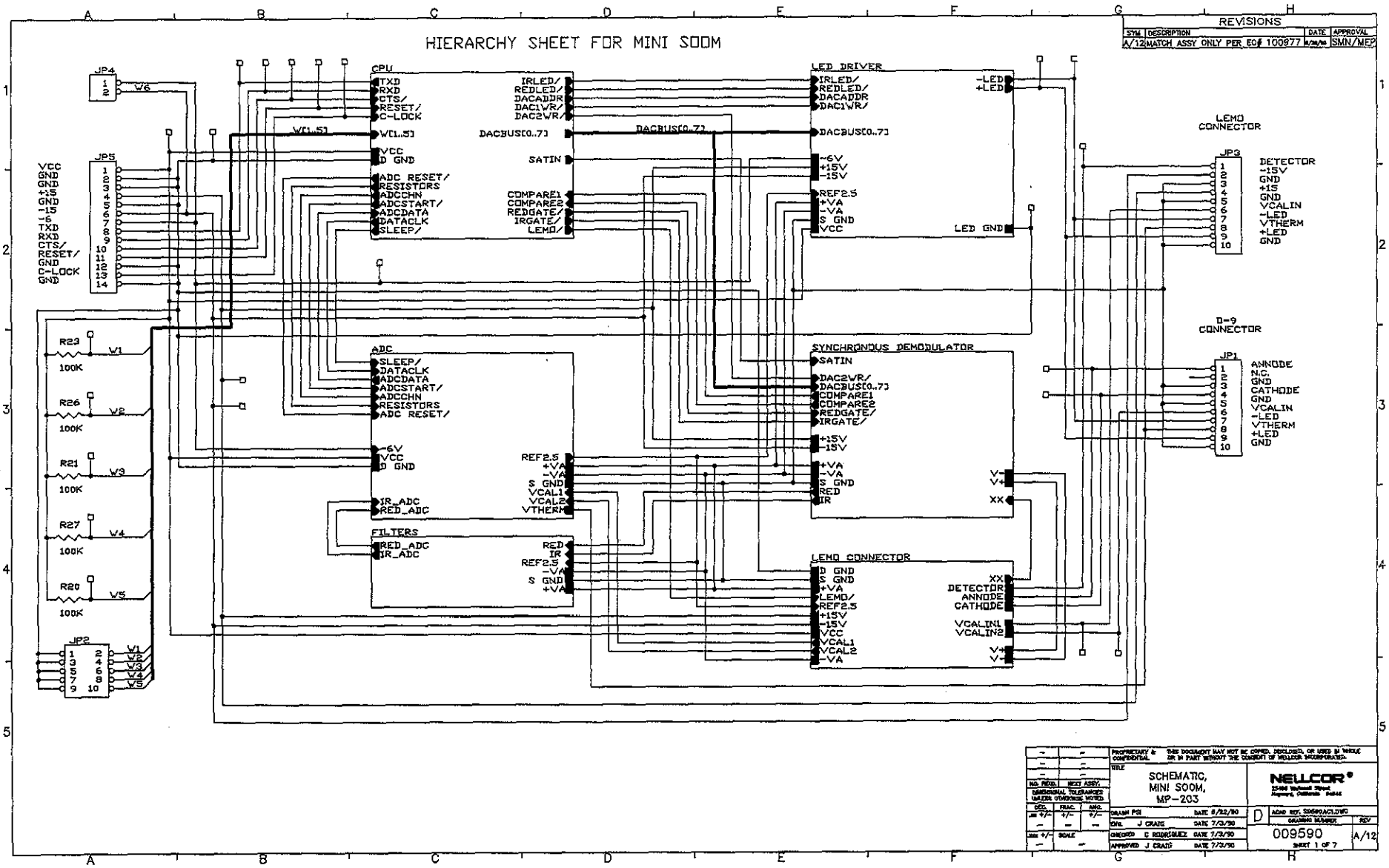
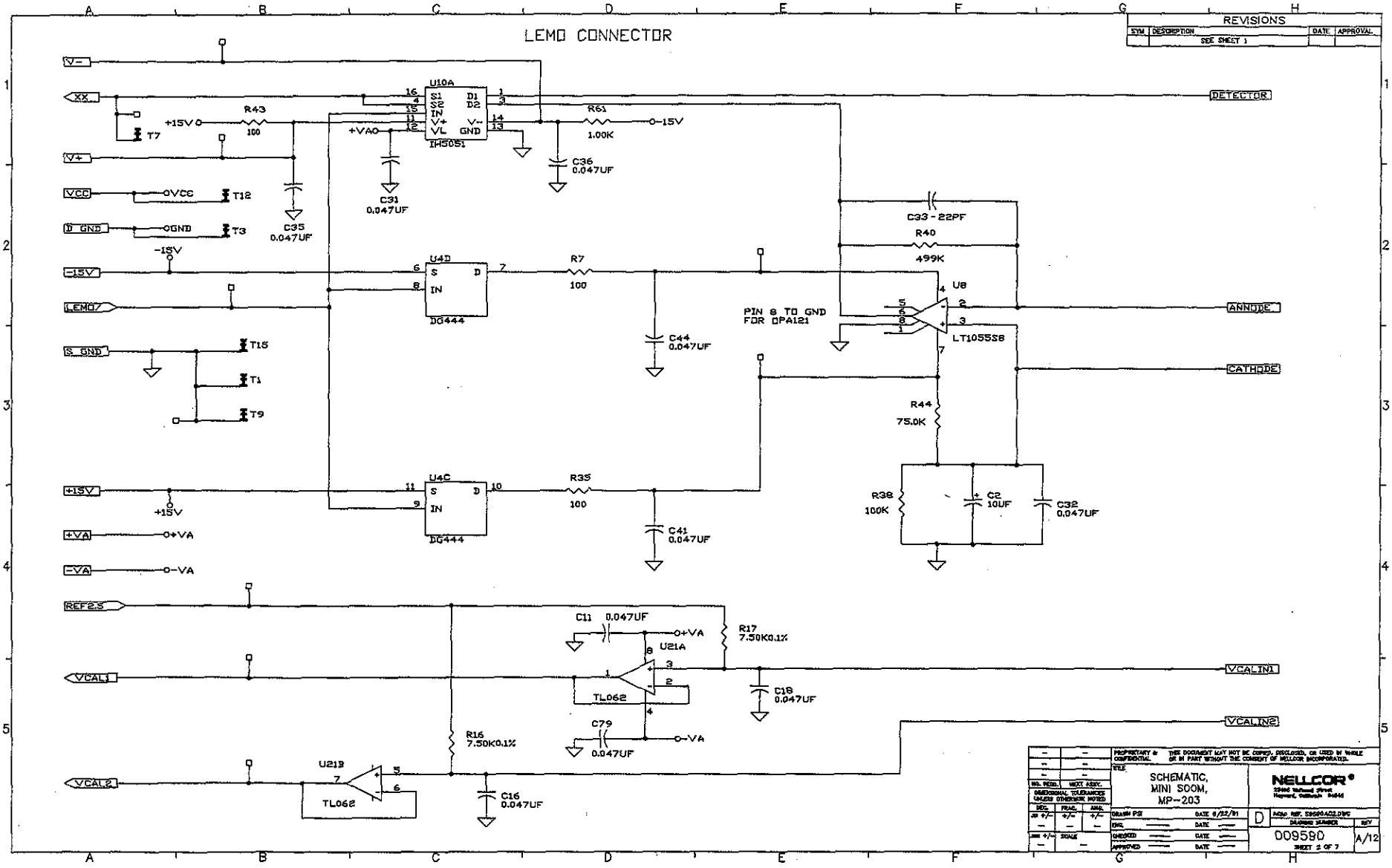
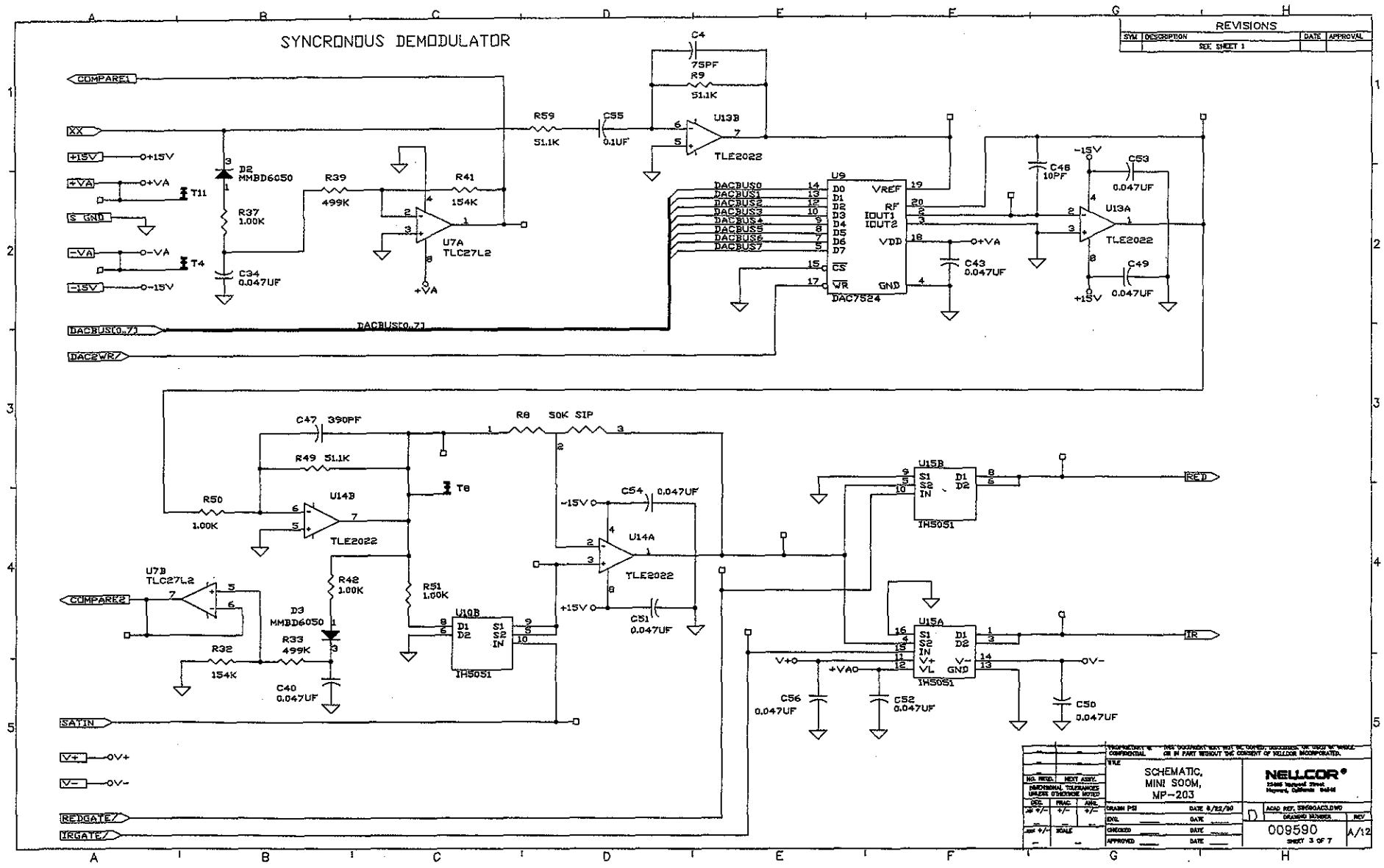
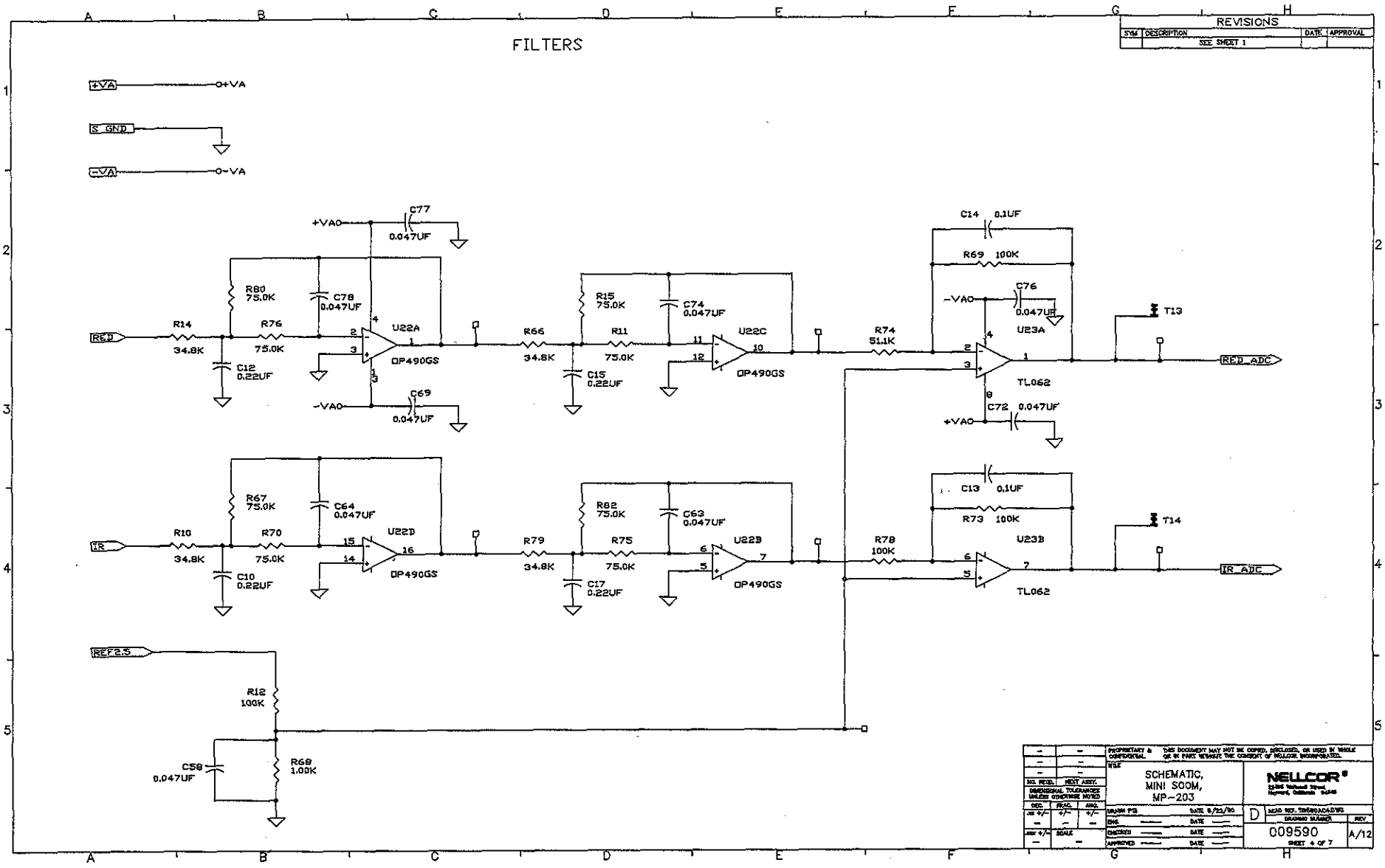
DESIGNED R. LIBBY 9-1-93
CHECKED B. SHOTWELL 9-3-93
ENGINEER R.J.O. 7-11-91
APPROVED R.J.O. 7-11-91
COROMETRICS® MEDICAL SYSTEMS, INC.
TITLE SCHEMATIC
POWER SUPPLY BD
MATERIAL
FINISH
SIZE D
DRAWING NUMBER 8370BC
REV. 03
SCALE
SHEET 2 of 2
8370BA 16
NEXT ASSY USED ON
APPLICATION


HIERARCHY SHEET FOR MINI SOOM
REVISIONS
SYM | DESCRIPTION | DATE | APPROVAL
A/12 MATCH ASSY ONLY PER EO# 100977 | SMN/MEP
CPU
LED DRIVER
ADC
SYNCHRONOUS DEMODULATOR
FILTERS
LEMO CONNECTOR
LEMO CONNECTOR
D-9 CONNECTOR
JP1
JP2
JP3
JP4
JP5
R23
R26
R21
R27
R20
100K
DETECTOR
ANNODE
CATHODE
SCHEMATIC, MINI SOOM, MP-203
NELLCOR
009590
A/12
SHEET 1 OF 7


LEMO CONNECTOR
REVISIONS
SYM | DESCRIPTION | DATE | APPROVAL
SEE SHEET 1
V-
XX
V+
VCC
D GND
-15V
LEMO
S GND
+15V
+VA
-VA
REF2.5
VCAL1
VCAL2
DETECTOR
ANNODE
CATHODE
VCALIN1
VCALIN2
U10A
IH5051
R43
100
R61
1.00K
C31
0.047UF
C35
0.047UF
C36
0.047UF
C33 - 22PF
R40
499K
U4D
DG444
R7
100
C44
0.047UF
PIN 8 TO GND
FOR OPA121
U8
LT1055S8
R44
75.0K
U4C
DG444
R35
100
C41
0.047UF
R38
100K
C2
10UF
C32
0.047UF
C11 0.047UF
R17
7.50K0.1%
U21A
TL062
C18
0.047UF
C79
0.047UF
R16
7.50K0.1%
U21B
TL062
C16
0.047UF
SCHEMATIC,
MINI SOOM,
MP-203
NELLCOR
D
009590
A/12
SHEET 2 OF 7


SYNCRONOUS DEMODULATOR
REVISIONS
SYM | DESCRIPTION | DATE | APPROVAL
SEE SHEET 1
COMPARE1
XX
+15V
+VA
S GND
-VA
-15V
D2 MMBD6050
R37 1.00K
C34 0.047UF
R39 499K
R41 154K
U7A TLC27L2
R59 51.1K
C55 0.1UF
C4 75PF
R9 51.1K
U13B TLE2022
DACBUS0
DACBUS1
DACBUS2
DACBUS3
DACBUS4
DACBUS5
DACBUS6
DACBUS7
U9 DAC7524
C43 0.047UF
C46 10PF
C53 0.047UF
U13A TLE2022
C49 0.047UF
DACBUS[0..7]
DAC2WR/
C47 390PF
R8 50K SIP
R49 51.1K
R50 1.00K
U14B TLE2022
C54 0.047UF
U14A TLE2022
C51 0.047UF
U15B IH5051
RED
U7B TLC27L2
COMPARE2
D3 MMBD6050
R42 1.00K
R51 1.00K
R33 499K
R32 154K
C40 0.047UF
U10B IH5051
U15A IH5051
IR
V+
V-
C56 0.047UF
C52 0.047UF
C50 0.047UF
SATIN
REDGATE/
IRGATE/
SCHEMATIC, MINI SOOM, MP-203
NELCOR
009590
A/12


FILTERS
REVISIONS
SYM | DESCRIPTION | DATE | APPROVAL
SEE SHEET 1
+VA
+VA
S GND
-VA
-VA
+VAO
C77
0.047UF
R80
75.0K
C78
0.047UF
RED
R14
34.8K
R76
75.0K
U22A
OP490GS
C12
0.22UF
-VAO
C69
0.047UF
R66
34.8K
R15
75.0K
C74
0.047UF
R11
75.0K
U22C
OP490GS
C15
0.22UF
R74
51.1K
C14
0.1UF
R69
100K
-VAO
C76
0.047UF
U23A
TL062
T13
RED_ADC
+VAO
C72
0.047UF
IR
R10
34.8K
R70
75.0K
C10
0.22UF
R67
75.0K
C64
0.047UF
U22D
OP490GS
R79
34.8K
R82
75.0K
C63
0.047UF
R75
75.0K
U22B
OP490GS
C17
0.22UF
R78
100K
C13
0.1UF
R73
100K
U23B
TL062
T14
IR_ADC
REF2.5
R12
100K
C58
0.047UF
R68
1.00K
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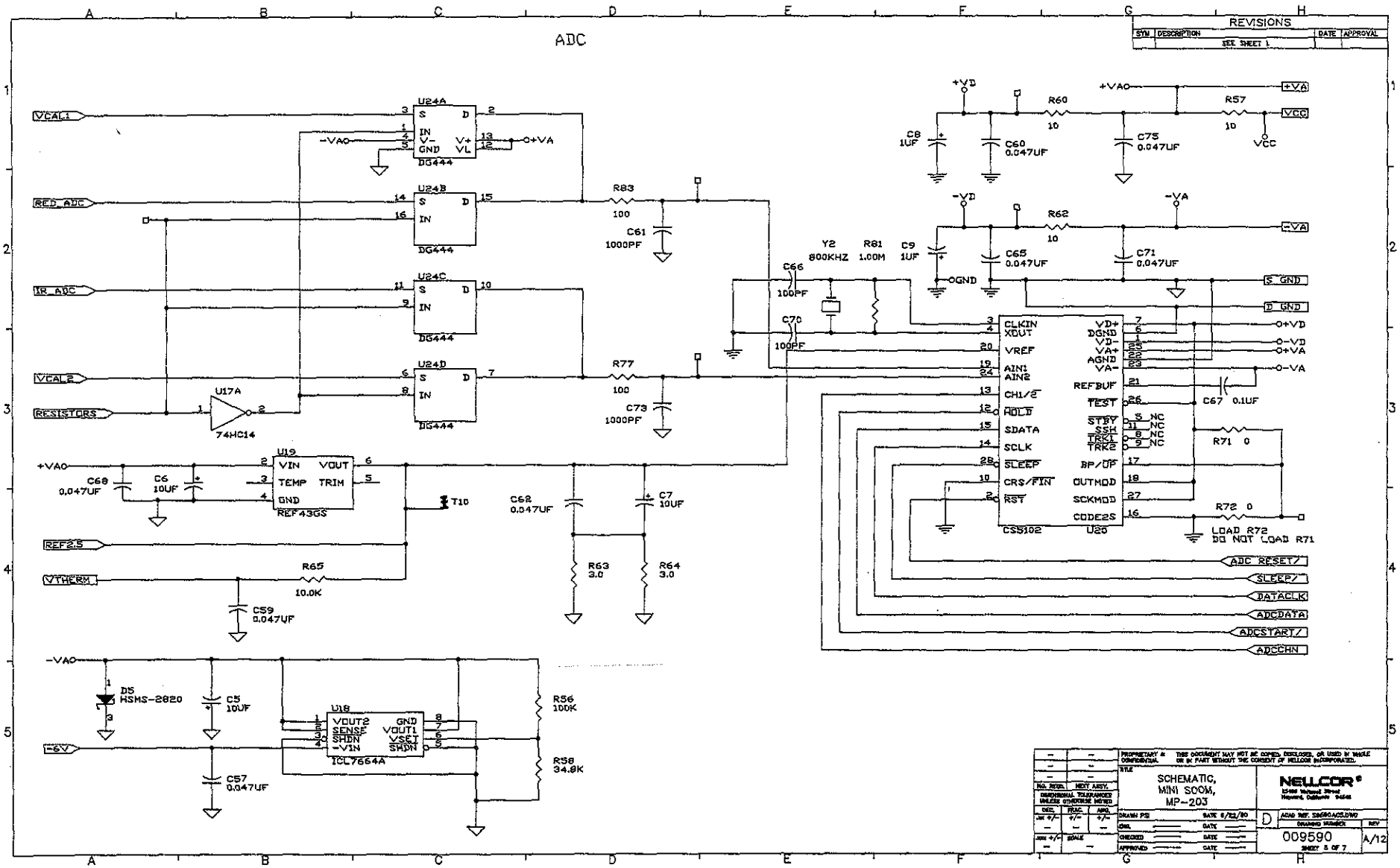
TITLE
SCHEMATIC, MINI SOOM, MP-203
NELLCOR
DRAWN PS
DATE 8/21/96
ENG
DATE
CHECKED
DATE
APPROVED
DATE
SIZE D
DRAWING NUMBER 009590
REV A/12
SHEET 4 OF 7

15.20


ADC
REVISIONS
SYM | DESCRIPTION | DATE | APPROVAL
SEE SHEET 1
VCAL1
RED_ADC
IR_ADC
VCAL2
RESISTORS
U24A
U24B
U24C
U24D
DG444
-VAO
+VA
R83
100
C61
1000PF
R77
C73
U17A
74HC14
+VAO
C68
0.047UF
C6
10UF
U19
REF43GS
VIN
VOUT
TEMP
TRIM
GND
T10
C62
0.047UF
C7
10UF
REF2.5
VTHERM
R65
10.0K
C59
0.047UF
R63
3.0
R64
3.0
-VAO
D5
HSMS-2820
C5
10UF
-5V
C57
0.047UF
U18
ICL7664A
VOUT2
SENSE
SHDN
-VIN
GND
VOUT1
VSET
SHDN
R56
100K
R58
34.8K
+VD
R60
10
+VAO
R57
10
+VA
VCC
C8
1UF
C60
0.047UF
C75
0.047UF
-VD
R62
10
-VA
-VA
C65
0.047UF
C71
0.047UF
GND
S_GND
D_GND
+VD
-VD
+VA
-VA
Y2
800KHZ
R61
1.00M
C9
1UF
C66
100PF
C70
100PF
CLKIN
XOUT
VREF
AIN1
AIN2
CH1/2
HOLD
SDATA
SCLK
SLEEP
CRS/FIN
RST
VD+
DGND
VD-
VA+
AGND
VA-
REFBUF
TEST
STBY
SSH
TRK1
TRK2
BP/UP
OUTMOD
SCKMOD
CODE2S
CS5102
U20
C67 0.1UF
R71 0
R72 0
LOAD R72
DO NOT LOAD R71
ADC_RESET/
SLEEP/
DATACLK
ADCDATA
ADCSTART/
ADCCHN
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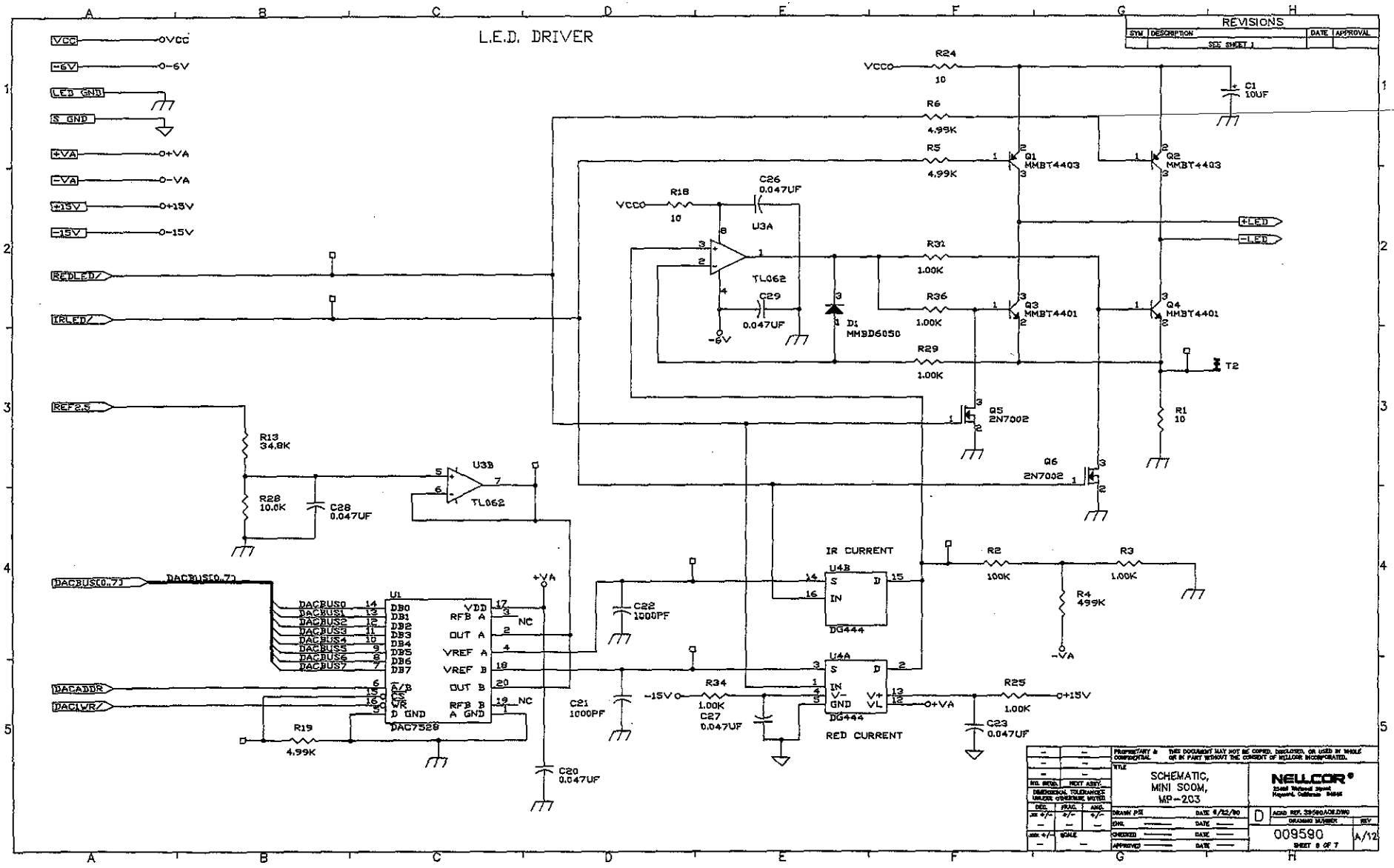
TITLE
SCHEMATIC, MINI SOOM, MP-203
NELLCOR
DRAWN PSI
DATE 8/22/00
CHECKED
APPROVED
SIZE D
DRAWING NUMBER
009590
REV A/12
SHEET 5 OF 7


L.E.D. DRIVER
REVISIONS
SYM | DESCRIPTION | DATE | APPROVAL
SEE SHEET 1
VCC
-6V
LED GND
S GND
+VA
-VA
+15V
-15V
RED LED/
IR LED/
REF2.5
DACBUS[0..7]
DACADDR
DACLWR/
+LED
-LED
T2
R24 10
C1 10UF
R6 4.99K
R5 4.99K
Q1 MMBT4403
Q2 MMBT4403
R18 10
C26 0.047UF
U3A
TL062
C29 0.047UF
D1 MMBD6050
R31 1.00K
R36 1.00K
Q3 MMBT4401
Q4 MMBT4401
R29 1.00K
Q5 2N7002
Q6 2N7002
R1 10
R13 34.8K
R28 10.0K
C28 0.047UF
U3B
TL062
U1
DAC7528
DB0 DB1 DB2 DB3 DB4 DB5 DB6 DB7
VDD RFB A OUT A VREF A VREF B OUT B RFB B A GND D GND
NC
R19 4.99K
C20 0.047UF
C22 1000PF
C21 1000PF
IR CURRENT
U4B
DG444
R2 100K
R3 1.00K
R4 499K
-VA
U4A
DG444
R34 1.00K
C27 0.047UF
RED CURRENT
R25 1.00K
C23 0.047UF
+15V
+VA
-15V
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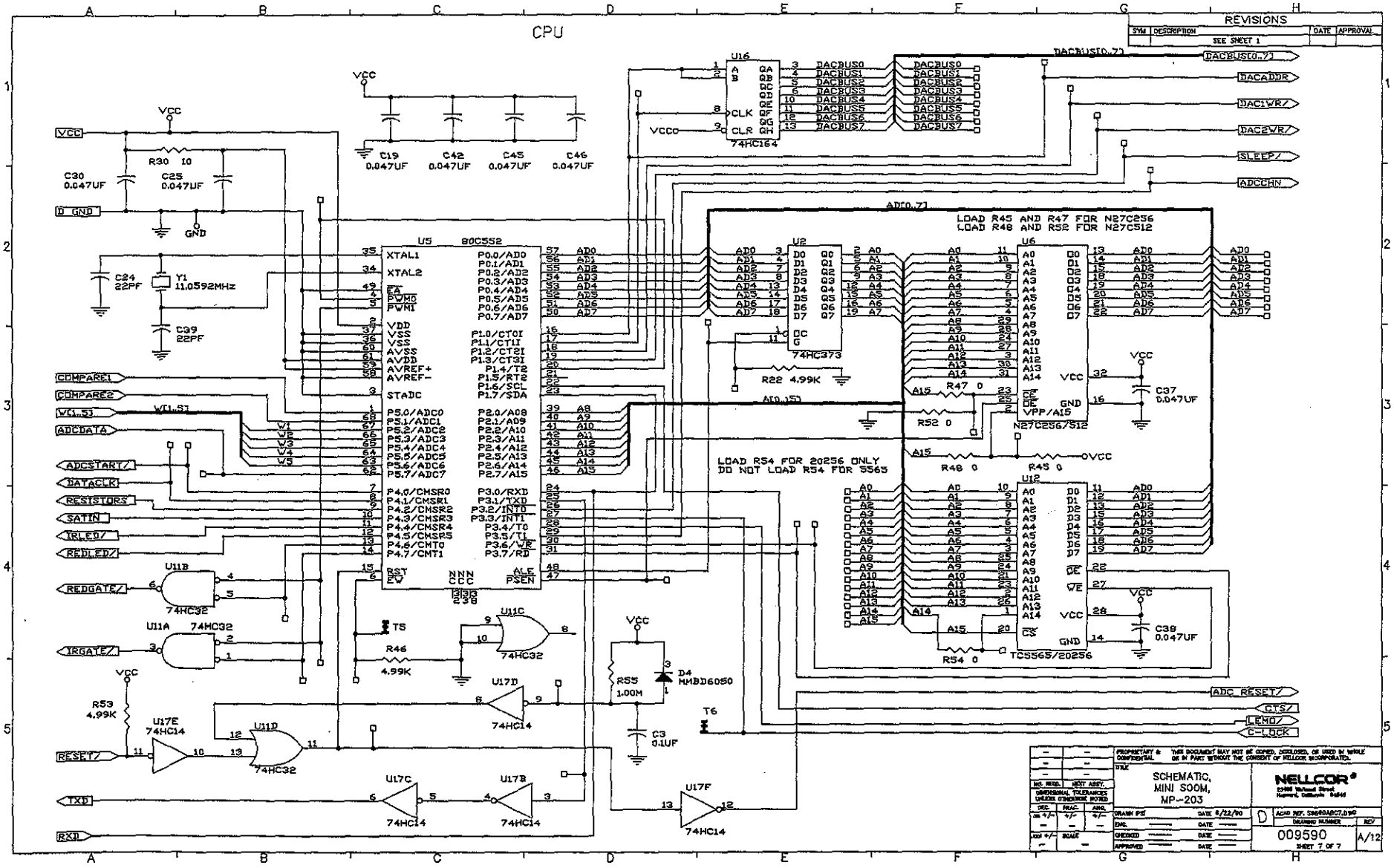
TITLE
SCHEMATIC, MINI SOOM, MP-203
NELLCOR
DRAWN PJS
DATE 6/12/90
CHKD
APPROVED
DRAWING NUMBER
009590
REV
A/12
SHEET 8 OF 7


CPU
REVISIONS
SYM | DESCRIPTION | DATE | APPROVAL
SEE SHEET 1
U5 80C552
XTAL1
XTAL2
VDD
VSS
AVSS
AVDD
AVREF+
AVREF-
STADC
P0.0/AD0
P0.1/AD1
P0.2/AD2
P0.3/AD3
P0.4/AD4
P0.5/AD5
P0.6/AD6
P0.7/AD7
P1.0/CTOI
P1.1/CTII
P1.2/CT2I
P1.3/CT3I
P1.4/T2
P1.5/RT2
P1.6/SCL
P1.7/SDA
P2.0/A08
P2.1/A09
P2.2/A10
P2.3/A11
P2.4/A12
P2.5/A13
P2.6/A14
P2.7/A15
P3.0/RXD
P3.1/TXD
P3.2/INT0
P3.3/INT1
P3.4/T0
P3.5/T1
P3.6/WR
P3.7/RD
ALE
PSEN
C24 22PF
C39 22PF
Y1 11.0592MHz
C30 0.047UF
C25 0.047UF
R30 10
C19 0.047UF
C42 0.047UF
C45 0.047UF
C46 0.047UF
U16 74HC164
DACBUS0..7
U2 74HC373
U6 N27C256/512
U12 TC5565/20256
LOAD R45 AND R47 FOR N27C256
LOAD R48 AND R52 FOR N27C512
LOAD R54 FOR 20256 ONLY
DO NOT LOAD R54 FOR 5565
R22 4.99K
R52 0
R47 0
R48 0
R45 0
R54 0
C37 0.047UF
C38 0.047UF
COMPARE1
COMPARE2
VCL.5J
ADCDATA
ADCSTART/
DATACLK
RESISTORS
SATIN
TRLED/
REDLED/
REDGATE/
IRGATE/
RESET/
TXD
RXD
U11B 74HC32
U11A 74HC32
U11C 74HC32
U11D 74HC32
U17D 74HC14
U17E 74HC14
U17C 74HC14
U17B 74HC14
U17F 74HC14
R53 4.99K
R46 4.99K
R55 1.00M
D4 MMBD6050
C3 0.1UF
T5
T6
ADC_RESET/
GTS/
LEMO/
C-LOCK
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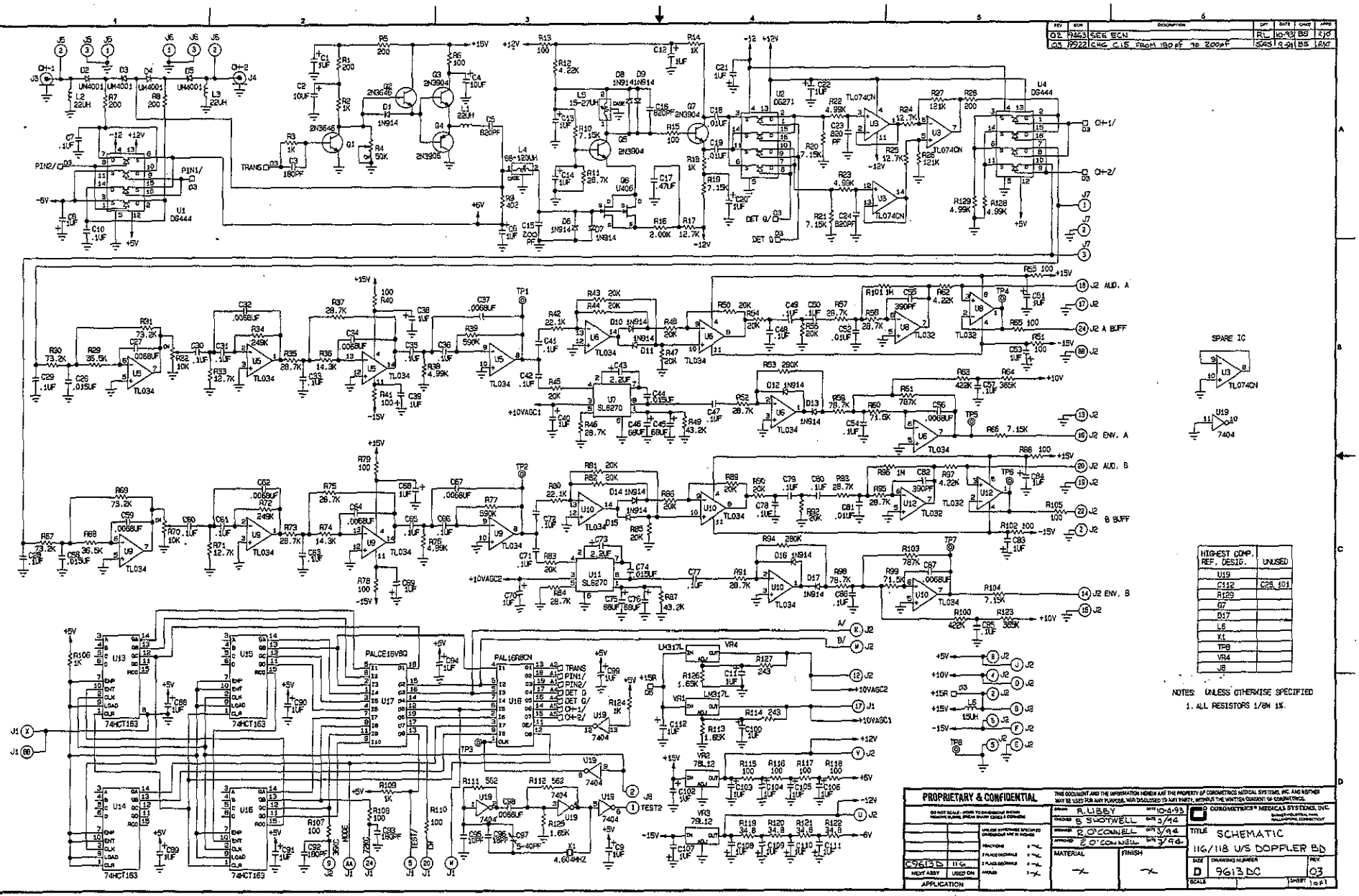
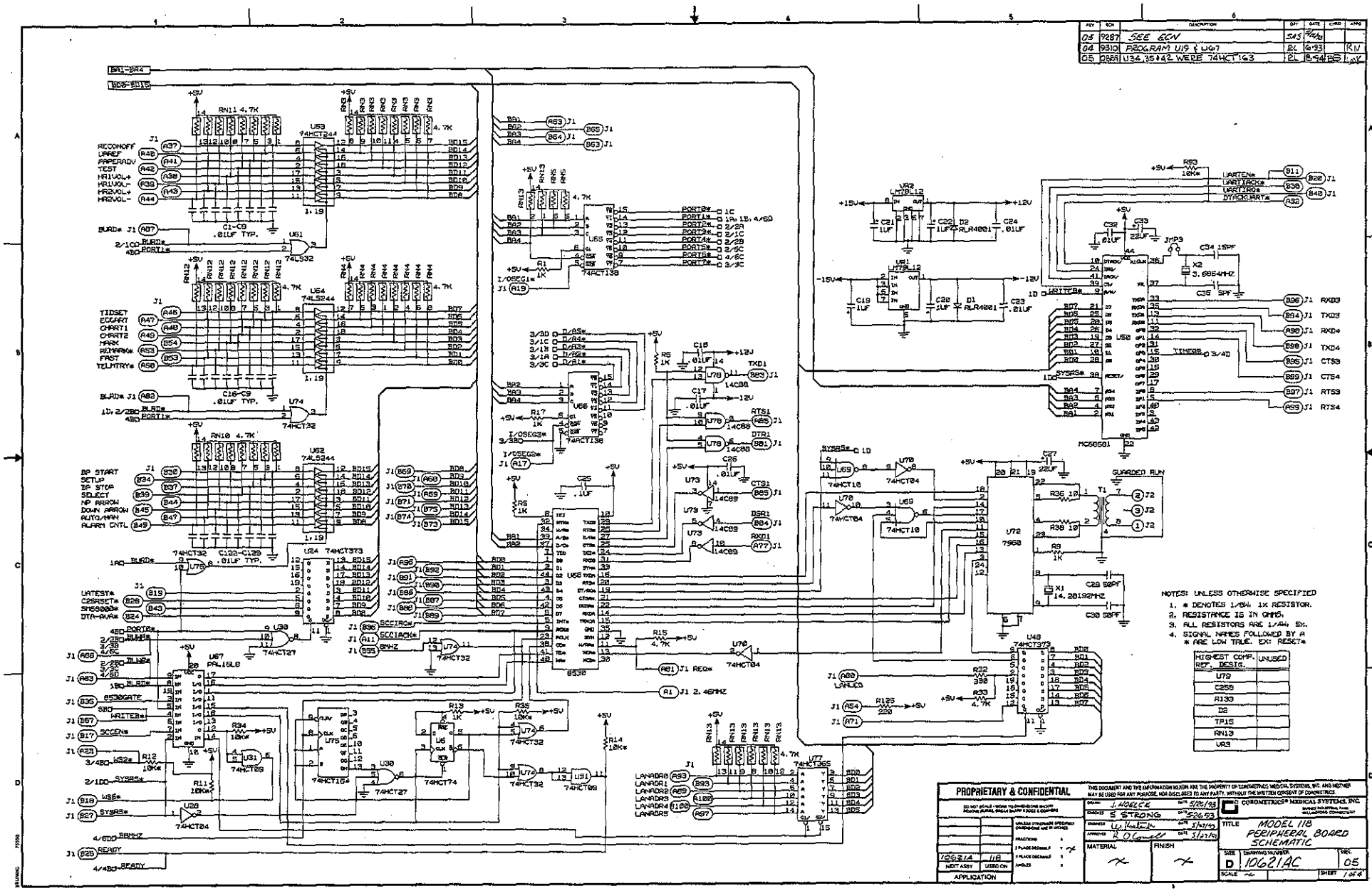
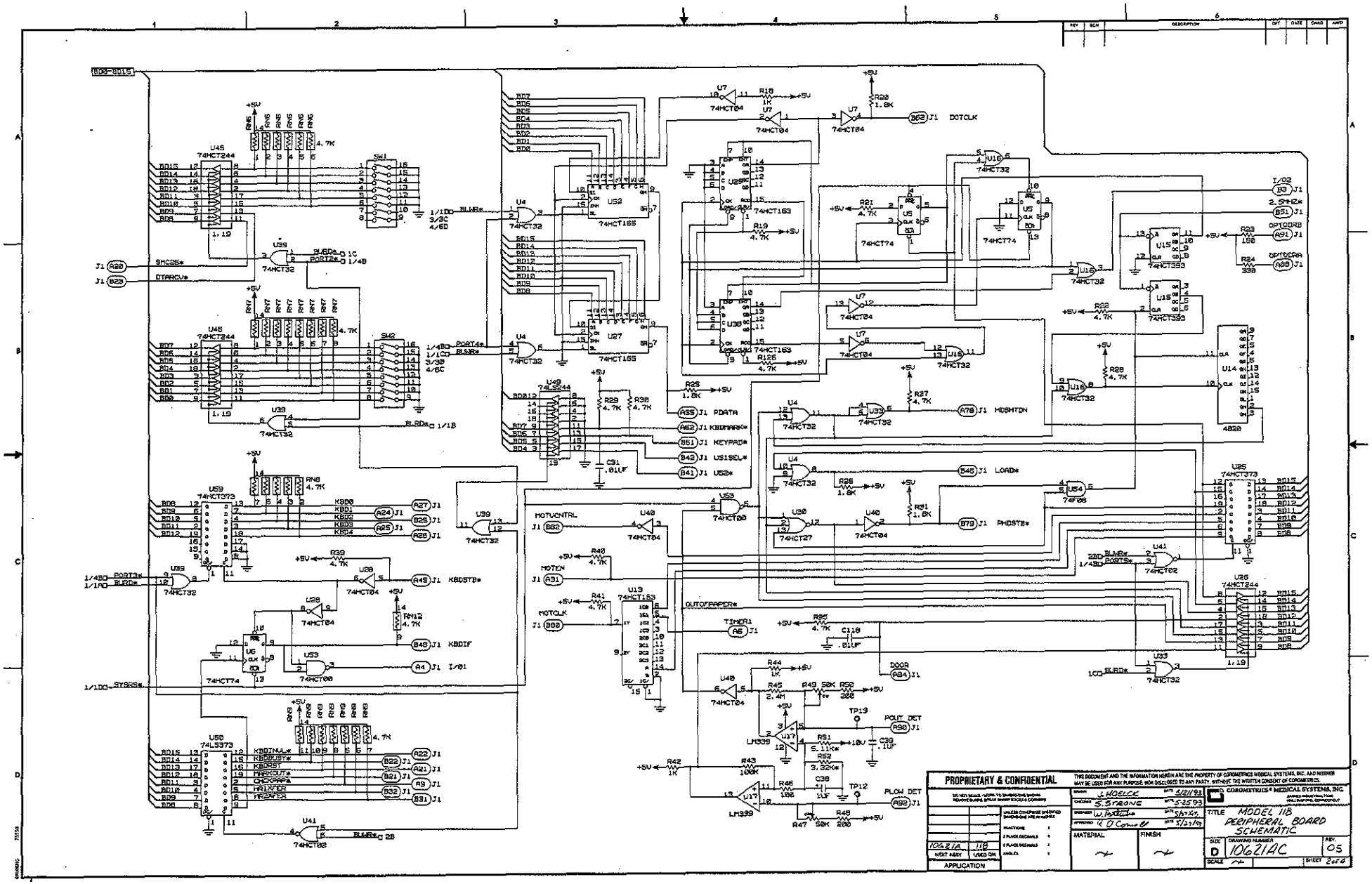
TITLE
SCHEMATIC, MINI SOOM, MP-203
NELLCOR
DRAWN PS DATE 8/22/90
ENG. DATE
CHECKED DATE
APPROVED DATE
SCALE
D
ACAD REV. SM590ADC7.DWG
DRAWING NUMBER 009590
REV A/12
SHEET 7 OF 7



HIGHEST COMP. REF. DESIG.	UNUSED
U19	
C112	C25, 101
R129	
Q7	
D17	
L6	
X1	
TP8	
VR4	
J8	


REV | SCH | DESCRIPTION | DFT | DATE | CHKD | APPD
05 9287 SEE ECN SAS 7/94
04 9310 PROGRAM U19 & U67 PL 6/93 RN
05 0884 U34,35 & 42 WERE 74HCT163 PL 8/94 RS
PROPRIETARY & CONFIDENTIAL
COROMETRICS® MEDICAL SYSTEMS, INC.
TITLE MODEL 118 PERIPHERAL BOARD SCHEMATIC
DRAWING NUMBER 10621AC REV 05
SIZE D
SHEET 1 of 8
NOTES: UNLESS OTHERWISE SPECIFIED
1. # DENOTES 1/8W 1% RESISTOR.
2. RESISTANCE IS IN OHMS.
3. ALL RESISTORS ARE 1/4W 5%.
4. SIGNAL NAMES FOLLOWED BY A * ARE LOW TRUE. EX: RESET*
HIGHEST COMP. REF. DESIG. | UNUSED
U79
C258
R133
D2
TP15
RN13
VR3


PROPRIETARY & CONFIDENTIAL
COROMETRICS MEDICAL SYSTEMS, INC.
MODEL 118
PERIPHERAL BOARD
SCHEMATIC
106218
118
D
106218C
05
SHEET 2 of 4